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JOURNAL

OF THE

FRANKLIN INSTITUTE

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OF THE

State of Pennsylvania;

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

EDITED

BY THOMAS P. JONES, M. D.

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JULY, 1833.

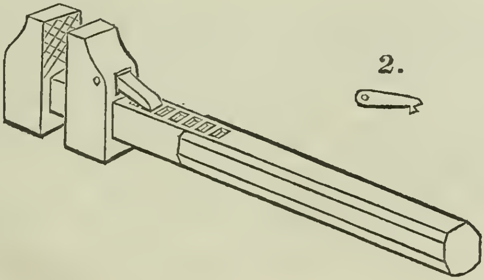
Description of a new Rack Wrench.

Philadelphia, May 18*th*, 1833.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN,—In reading over the list of patents in the April number of the Journal of the Institute, I was struck with the great similarity of a rack wrench, patented by Mr. King, (see page 249,) with one invented by me, and made eighteen months ago. In the first plan which occurred to me, I intended to employ a spring to keep the click of the wrench in its place, but I preferred not to use it on account of its liability to get out of order

Fig. 1.



2.

The form of the click is shown in the figure accompanying; it is simple, and answers every purpose. The figure is drawn to the full size* of the wrench in my possession; it is made of iron case hardened, with the exception of the click, which is of cast steel. The wrench has now been in use eighteen months, and its good qualities have been tested by strains of considerable amount.

Fig. 1 represents the wrench, and fig. 2 is the click which is shown in its place in fig. 1.

Yours respectfully,
A. C. J.

On the construction of De Luc's Columns, as modified by Zamboni: and on a modification of the single leaf Electrometers contrived by the author, by which the ultimate efficiency of a large electric series, may be ascertained, by testing a small portion of the members of which it is to be constituted. Also on the employment of the same instrument, as an Electrical Discriminator.

By ROBERT HARE, M. D., Professor of Chemistry in the University of Pennsylvania.

About fifteen years ago, the construction of De Luc's electric columns, as modified by Zamboni, was undertaken by Isaiah Lukens, one of our most skilful and ingenious mechanicians.

The materials employed were paper covered with leaf tin, (erroneneously called silvered paper,) peroxide of manganese, and crystallized sulphate of zinc.

The peroxide was finely pulverized, and mixed with a concentrated solution of the sulphate. The mixture thus formed was, by means of a brush, applied like a pigment to the surfaces of the paper not coated by the tin. The sheets were afterwards spread out on the floor of an apartment, and left during the night to dry. By these means, unnecessary exposure to light was avoided, which Mr. Lukens conceives to be injurious, especially as received directly from the sun. Next day the sheets were cut into disks of about five-eighths inch diameter, by means of a hollow punch. The disks were then piled, with the heterogenous surfaces alternating, as in other voltaic series, and were introduced into, and compressed within, glass tubes, accoutered as usual with pedestals, caps, and bells. Notwithstanding his skill and experience, Mr. Lukens latterly complained of occasional want of success, arising, as he supposed, from the defective quality of the manganese. In various instances, his columns, after being completed with the utmost care, proved inert.

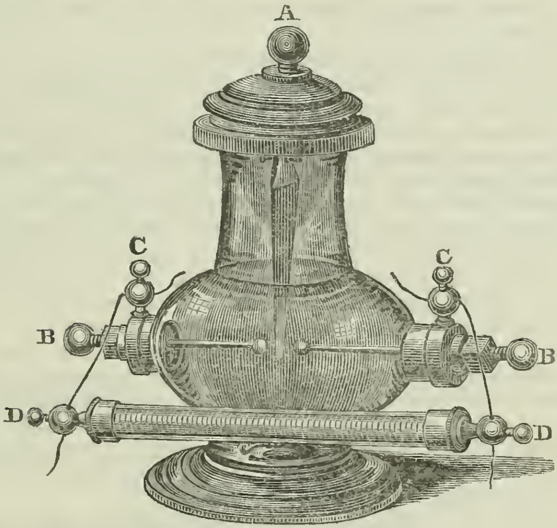
The manipulation, likewise, according to his plan of operating, appeared to me, to be troublesome and precarious. He was accus-

* This has been reduced in the cut to one-fifth the size of the original drawing. COM. PUB.

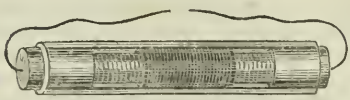
tomed to place a row of the disks, as large as could be conveniently handled, in a trough of sheet metal; and then transfer the pile thus formed to the glass tubes. This operation, to be successful, required dexterity.

Last winter, wishing to replenish the tubes of a pair of electric columns which had become effete, I contrived to avoid the risk of expending the labour and attention requisite to finish a series, while uncertain as to its eventual efficiency. I contrived, likewise, by a very simple expedient, to facilitate the process of piling the disks.

The first mentioned desideratum was obtained by means of a single leaf of gold, suspended in a glass vessel, (represented by the subjoined figure,) between two knobs at the ends severally of two brass rods B B, proceeding through opposite sides of the vessel towards each other, so as to be capable, if requisite, of meeting in the centre.



By means of screws, the knobs on these rods, were susceptible of being adjusted to any distance from the gold leaf, suspended between them. Externally the rods are so made and placed, as to be easily connected with wires. In the gold leaf thus situated, vibrations may be produced by a series of disks, comprising not more than one twentieth of the number necessary, to cause such a pendulum as commonly pertains to the electric column, to oscillate. In the case in point, I found that the disks produced by one sheet of paper, were sufficient to make the leaf vibrate actively between the knobs. The mode in which this effect was produced, may be understood from the following figure; which represents the disks, as compressed, in due order, within a glass tube, by spirals of wire.



Each of the wires of which these spirals were formed, at the ends enclosed in the tube, being unaltered throughout the remaining portions of their length, were passed through corks closing the orifices of the tube. The series thus prepared, is to be placed in the situation of the electric column, appended to the instrument agreeably to fig. 1, being in like manner suspended from the rods outside of the vessel, by means of the projecting wires already mentioned. Thus situated, if there be any adequate degree of electromotive power in the series under trial, and the atmosphere sufficiently dry, the excitement of the poles will be communicated to the knobs, and be indicated by the consequent vibrations of the gold leaf, suspended between them.

When a larger series is used, such as that represented at DD, fig. 1, the vibrations will be discontinued, only in consequence of the adherence of the leaf to one or the other of the knobs. This adherence usually ceases, on touching with a finger the little brass ball, at the vertex of the instrument, to which the forceps holding the leaf is affixed. The finger being removed, vibratory pulsations will recommence, to be sooner or later arrested in the same manner as at first.

When duly connected with the poles of a voltaic battery, of seven hundred pairs, excited merely by pure water, the pulsations of the leaf are quick and incessant. It serves in this way to indicate the electric intensity, but does not furnish any criterion of the divellant igniting, or electro magnetic powers, of a voltaic series.

It may readily be perceived, that the electrometer, constructed as herein described, constitutes an electrical indicator, which may enable us to discover the electromotive powers of various substances arranged as disks in a series, or as coatings to disks. I have already, with the aid of Mr. Wharton, one of my pupils, ascertained that aurum musivum spread on the tinned paper on the naked surface, produces an electromotive series.

The piling of the disks was facilitated by using a punch excavated so as to leave a point in the centre, by which the centre of each disk was punctured. By means of the puncture thus made, it was easy, even for an unskilful operator, to string them concentrically upon a silk thread, and to transfer them to the tubes without derangement.

The manganese which I employed with success, in the replenishment of the electric columns alluded to above, consisted mainly of needle shaped radiated crystals, aggregated into lumps. Mr. Lukens alleges that the crystallized manganese has always, agreeably to his experience, proved the best for the construction of electric columns.

The electrometer, with an electric column attached to it, as above represented, may serve to show the nature, as well as the extent of electric excitement; since, when an electrified mass is made to com-

municate with the brass ball A, from which the leaf is suspended, the latter ought to be attracted by that knob, which receives from the series an opposite excitement. Hence, the excitement of the electrified body being known, that of the poles may be detected; or the latter being known, the excitement of the body may be discovered. This application of the electric series, is not, however, a new idea. I saw many years ago a notice of an electrometer, associated with an electric column, in such manner, as to be used as an electrical discriminator.

The great difficulty in resorting to this means of discrimination, is, that an electrified body may, by induction, produce in a conductor alternately, opposite states of electrical excitement. As it approximates the conductor, it may cause it to receive, or give out electricity; of course, when retracted, the conductor will have the opposite excitement to that consequent to approximation. Supposing the brass ball of the electrometer in question, to be affected in the mode just described, the leaf suspended from it, must be successively attracted by each pole. Besides, the excitement may be so strong, as to render that of the series nugatory; as in the case of a powerful magnet, which will attract either pole of a feeble one.

The direction of the first pulsation of the leaf, is the best criterion; but reliance should not be accorded to one experiment, especially when so easily repeated. I find that a gilt pith ball, if suspended in place of the leaf, will vibrate for a time. It is, however, like the leaf, liable to have its movements arrested by an adherence, to one or other of the knobs.

Note of the effect upon the Magnetic Needle, of the Aurora Borealis, visible at Philadelphia, on the 17th of May, 1833,

By A. D. Bache, Professor of Natural Philosophy and Chemistry in the University of Pennsylvania.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—Circumstances having prevented me from witnessing more than a very small part of the unusually brilliant aurora which was visible on the evening of the 17th of May last, I am indebted for the following description of it to my friend J. P. Espy, Esq., who has kindly furnished it to me from his journal.

"On the 17th of May, 1833, the temperature of the air being 68°, and the dew point 66°, a brilliant aurora appeared in the north, about twenty or thirty degrees above the horizon, and extending about thirty or forty degrees on each side of the north point.

"I first saw it a few minutes after nine o'clock, when it was brighter than it appeared afterwards. Streamers, not in motion, were distinctly visible, rising from a dense light below, which seemed to rest on

dark clouds underneath, reaching the horizon. All the rest of the sky was clear, and had been so all the afternoon. In a few minutes the streamers disappeared, clouds, which suddenly formed, seeming to take their places, the northern lights still appearing nearly the same, only interrupted in part by a greater number of clouds. I continued to observe the aurora with intervals of but few minutes, and at nearly ten o'clock I discovered that a very brilliant arch had been formed, passing through the zenith, and terminated by the horizon, about twenty degrees south of east, and the same number north of west.

"This arch was much denser, brighter, and narrower, near the horizon than in the zenith. It passed gradually towards the south, and disappeared, at twenty minutes past ten, about eleven degrees south of Lyra. The clouds, at the time of the disappearance, were rapidly forming north of the arch, all the south being yet clear: in fifteen minutes afterwards the whole heaven was overcast, and the light in the north was hardly visible through the clouds. The air had been coming from the north in the morning, and had changed round by the west, and at the time of the occurrence of the arch it is believed was nearly south-west; below, the direction of the clouds was not observed.

"The dew-point had risen, since the preceding day, twelve degrees Fah. It is highly probable that an upper current (not the uppermost) of air, was moving in the direction in which the arch moved, as the air had been moving in that direction a few hours before, and I have frequently observed, when the wind changes, the lower strata next the earth, change first. From the 10th until the afternoon of the 15th of May, the wind had constantly been, by night and day, almost exactly south, with a high dew-point, carrying an immense quantity of vapour to the north; on the evening of the 15th, and until the night of the 16th, the wind was NE. with rain, and on the morning of the 17th the wind was north."

On returning home at eleven o'clock, on the evening just referred to, and observing the different magnetic needles which I have arranged for observations on the diurnal variation, a considerable disturbance was indicated. The journal of the hourly observations, kept during my absence in the evening, confirmed that what I had witnessed was but a part of the disturbance which had actually taken place, and which seems to have affected the horizontal needle especially.

The needles to which I have referred are three in number, two long horizontal needles, of which one is within-doors, and the other* is under cover in the yard attached to my residence, and a long dipping needle with a knife edge suspension, contained in a small observatory, constructed for the purpose, and also in the yard of my dwelling house. The observations of the horizontal needle, within doors, were made very regularly, and also of the dipping needle out of doors, but the observer not being aware of the appearance of the aurora, did not take the corresponding hourly observations of the horizontal needle out of doors, throughout the whole of the evening.

* A complete description of this needle is given in a paper read before the American Philosophical Society, in November last.

In order to convey a better idea of the variation on the evening in question, I precede the observations by those made on the following day and night, on which the changes of variation and dip were nearly the regular mean diurnal changes at this time of the year. The variation is referred to the mean variation for the day, or to a point nearly corresponding to this, the sign + being prefixed to the positions *west* of this line of mean variation, and the sign — to those *east* of the same line. The height of the thermometers contained in the boxes with the needles is given.

Time of observation.	Horizontal Needles.				Dipping Needle.		Weather.
	Diurnal changes of variation. Needle out of doors.	Attached Thermometer.	Diurnal changes of variation. Needle in doors.	Attached Thermometer.	Dip of the needle.	Thermometer attached.	
	Minutes	Fah.°	Minutes	Fah.°	° ′	Fah.°	
A.M. 8¼	— 7.5		0.0	72°	71 40	71.4	Cloudy.
9	—16.5	70°	0.0	73	,, 36	72.5	Do.
10¼	— 7.5	72	—1.5	73	,, 36	72.5	Do.
11	— 4.5	74	—3.0	74	,, 36	74.2	Do.
12	+ 0.5	74	0.0	74	,, 36	75.3	Do.
P.M. 1	+13.5	77	0.0	74	,, 33	78.1	Sun out occasionally.
2½	+12.5	82	+3.0	75	,, 30	82.1	
3	+15.0	83	+3.0	75		82.6	Sun out. Clear.
4½	+13.5	82	+3.0	76	,, 42	83.8	Clear.
5¼	+ 6.0	82	—1.5	76	,, 42	82.6	Do.
6	+ 1.5	81	—3.0	76	,, 48	81.5	Do.
7	— 4.5	79	—3.0	75	,, 51	79.3	Do.
8			0.0	75	,, 45	75.9	Light fleeces. (Cirrus.)
9¼	—10.5	76	0.0	74	,, 48	74.8	
10½	—10.5	74	0.0	74	,, 48	74.8	
11	— 3.5	74			,, 42	74.0	Clear.

From the table just given it appears that on the 18th of May, the westerly variation, as given by the horizontal needle out of doors, had two distinct points of minimum, the first at 9, A. M., and the latter between 9¼ and 10½, P. M., and two points of maximum, the first at 3, P. M., and the second at some period, not ascertained, after 11, P. M. The same variation shown by the needle within doors, had its minima at 11, A. M., and from 6 to 7, P. M., its maxima between 2½ and 4½, P. M., and at some hour of the night which was not ascertained. The temperatures of the two

needles being very different, the effect of changes of temperature should be ascertained to render the results strictly comparable; a remark which suggests the object, in part, of the observations upon these two needles, so differently situated.

In the dip we find a minimum at $2\frac{1}{2}$, P. M., as the only point very decidedly marked: there is an apparent maximum at 7, which the subsequent observations seem to indicate to have been the result of causes foreign to those producing the regular diurnal changes of dip.

The observed changes for this day, just given, are not entirely regular, and should be considered, of course, in the light of particular results affording merely a term of comparison, which is sufficiently accurate for the purpose in view.

I now give a table of some of the observations for May 17th, with a column of remarks, the portion of which relating to the aurora is drawn from the description by Mr. Espy, already given.

Hour of observation.	Horizontal Needles.				Dipping Needle.		Remarks.
	Changes of variation. Needle out of doors.	Attached Thermometer.	Changes of variation. Needle within doors.	Attached Thermometer.	Changes of dip.	Attached Thermometer.	
	Minutes	Fah.°	Minutes	Fah.°	° ′	Fah.°	
A. M. $8\frac{1}{4}$	— 1.5	60	—9.0	70	71 33	59.6	Cloudy.
11			—1.0	$70\frac{1}{2}$			Sun out.
P. M. 1			+7.0	71			
3			+7.0	72	,, 12	74.8	Cloudy.
4	+15.0	67	+7.0	72	,, 09	75.9	Sun out.
5	+ 1.5	77	+5.5	72	,, 18	75.9	Clear.
$7\frac{1}{2}$					,, 36	73.4	
$8\frac{1}{2}$			—3.0	72	,, 30	71.9	
9			—1.5	72	,, 34	71.4	Aurora bright; streamers; arch forms about 10, P. M.; arch disappears 10h.20m
$10\frac{1}{2}$			—13.5	72	,, 30	70.3	Sky overcast.
11	—13.5	68			,, 36	69.1	Low stratus.

By comparing the third column of this table with the corresponding column of the first table, we find throughout the day the general accordance in the relative positions of the needle a minimum of westerly variation at about 8, A. M., a maximum between 1, P. M. and 4, P. M., a second minimum about 8, P. M., a tendency towards a second maximum, which was interrupted by the aurora. There does not appear to have been any marked change from $8\frac{1}{2}$, P. M., to 9; so that the first part of the phenomenon

does not seem to have affected the variation. Observations are wanting to show when the effect began to be felt, and when it was at the greatest, and the near coincidence of the observation at half past ten with the time of the disappearance of the arch, must, of course, be regarded as accidental. In the interval of an hour and a half, between 9 and 10½, P. M., the needle had moved to the eastward 12′, or one-fifth of a degree; and the observations during the early part of the phenomena tend to show, if they do not prove, that this motion took place in the latter part of the interval, the mean hourly rate of motion, as shown by the observations at 8½ and 9, P. M., being only three minutes. I regret that the observations were not more regular; but as no particular interest attached to the evening, the observer, as I have already stated, not being aware of the presence of the aurora, I considered myself fortunate in the frequency of those observations which were made; this being a part of the evening in which, usually, there is nothing to require regular observations, being the interval between the evening minimum and the night maximum.

The observations on the horizontal needle out of doors do not contradict any of the remarks just made, and they show further that at 11, P. M., forty minutes after the disappearance of the arch, the effect on the needle was still strongly marked; the westerly variation at 11, P. M., having been 10 minutes less than on the same hour of the next succeeding evening. The very rapid formation and disappearance of clouds during the evening, and the low stratus which formed about eleven o'clock, would all, in ordinary cases, have produced slightly marked changes in the variation, but nothing of the character of those noted in the table. The temperature having remained stationary, within doors, during the evening, no part of the changes in the position of the horizontal needle noted in the third column, were due to variations of temperature. The results, in the absence of correction for these changes, are therefore the more valuable.

The dip, recorded in the fifth column of the table last given, has its minimum at 4, P. M., a rise then begins, which is so very irregular as not to permit any inference from it; diminishing between 7½ and 8½, P. M., it increases between 8½ and 9, decreases between 9 and 10½, and subsequently increases to 11 o'clock. These changes do not seem to attach to the different phases of the aurora, and are not more considerable than ordinary meteorological phenomena would produce, such, for example as are recorded in the first table.

My aim having been merely to establish that a decided disturbance of the horizontal needle was produced by the aurora of the 17th, I have not thought it necessary to apply the corrections for the temperature of the needles which the successful establishment of the changes in diurnal variation will require.

Jennison's Compressor and Foveats.

In our list of patents for August last, we noticed one obtained by Mr. T. L. Jennison, for a *compressor and foveats;* our remarks re-

specting it may be found at p. 168 of the last volume. We have since received the subjoined letter from the patentee, and although he does not intimate any desire for its publication, we think it right to permit him to offer his own opinions, in his own way. To the readers of this journal it is not necessary to say that we speak freely and fearlessly on the multitudinous subjects presented to our examination in the files of the patent office; in the performance of this duty we aim, also, at the most perfect candour, and must frequently, of course, come into collision with inventors who naturally look at their own projects with a favourable eye. Our opinions are, necessarily, made up from the evidence before us, which is usually nothing more than the description given by the patentee; this is often very defective, and does not, therefore, afford the desired information; and at other times we, undoubtedly, err in judgment, like other human beings. Be this as it may, but few complaints have reached us, all that have, have been noticed in the Journal, as we hold our pages open to the appeal of every one who thinks himself aggrieved by any thing which they contain. The letter which follows can scarcely be denominated a complaint, although it is apparent that the writer thinks we have dealt rather hardly by him: had it borne more heavily upon us, we still should have allowed the writer of it to speak for himself, as the communication which succeeds will amply prove.

EDITOR.

Cambridge, Massachusetts, April 30*th*, 1833.

SIR,—Hitherto we have been, and probably always shall remain, personally unknown to each other. By what I recently learn, you are an active member of the Franklin Institute; and probably prepared for the press the notice given to the public of my patented bathing machine, or *compressor* and *foveats.* I send you one of my printed descriptions of it; and in addition to that, ask permission to make for your consideration a few remarks on its structure and probable future utility. Its construction is so simple, as readily to be understood; and, although patented, there is reason for apprehending that imitations of it will be frequently attempted, in defiance of the law. It embraces the mechanic powers of the lever. The *foveats*, or old soft woollen clothes, are the parts to be compressed; the butt hinge serves as a fulcrum which is to be kept steady by one hand, while the handle is made to act (by the other) as a lever.

The original machine was made only twelve inches square; but found too small to compress the largest sized foveats, while the patented kind would accommodate every size. Fomentations for medical or surgical purposes are often required over a large surface, as the chest and bowels, the sides, the back, the hips, shoulders, and thighs. In all such cases, a small compressor will not answer. Neither can the ancient mode of squeezing or twisting the foveats, or cloths, be effected promptly, if very hot, by the hands alone, but readily by a large compressor; and after the cloths are laid over the

affected part, the heat in them may be kept up by large sponges heated in the fotus, then compressed and applied successively over different parts of them, according to the state of the circumambient air, which process may be aided by other means. The longer aromatic fomentations can be maintained of suitable temperature the better for discussion of congestions, if practicable; or maturation, if that process of nature cannot be avoided; and thereby a great saving of time and labour in the use of poultices, which has been the fashionable practice in France and elsewhere.

In the practical treatment of cholera hitherto, during the late epidemic, much stress was laid on the application of dry heat to the body and limbs of the patient, to the exclusion of moist heat. So far as we can judge by the result, they proved too often unsuccessful. Should that visitation of Providence appear among us in New England the present, or ensuing year, the treatment no doubt will be varied, and a fair trial of moist heat be introduced. In that case, my compressors would greatly aid the application of it, and assist in combating its hastily exhausting powers.

In cases of attempted resuscitation from drowning, after the body shall have been wiped dry, I think much stress might be placed on the utility of my compressor, using a half worn woollen blanket, torn into six or eight parts, so as to envelop the limbs and body therewith, after being plunged into heated water, and compressed; and which may be kept moderately hot by sponges as aforesaid.

I confess, sir, this is theory. For I have not been so unreasonable as to expect my neighbours would drown themselves, or tumble down stairs, or otherwise injure their persons, for my accommodation in making repeated trials of my apparatus. If my invention is adapted to important purposes in hospitals, so also, I think it must prove in ships of war, and large merchantmen. Wealthy people might as well decline buying a nursery lamp, or a lanthorn. If they escape the necessity of using them, it is their good fortune; but all their humble neighbours are not equally likely to escape from accidents requiring similar remedies. I have been denounced as demanding too high a price for them, ($6 00.) I can only reply to this by remarking, that I may as well (in my old age) undertake to raise potatoes for early marketing at twenty cents per bushel, as to sell this article at cost and charges. Nevertheless, they will hereafter be offered for sale at *five dollars each set.*

Here I pause, and hoping not to cause useless interruption to your more particular concerns, I am sir, with due respect,

Your unknown, obedient servant,

T. L. JENNISON.

Observations on the art of obtaining water by boring the earth; with some animadversions on the Editor's notice of a patent for certain improvements therein obtained, by Levi Disbrow and John L. Sullivan, in August last.

By John L. Sullivan, Civil Engineer.

TO THE EDITOR OF THE JOURNAL OF THE FRANKLIN INSTITUTE.

Sir,—Since the progress of geology in our country has discovered to us that our cities of the middle states have, in the stratified rock beneath them, springs of the purest water, accessible by the art of boring with that peculiar set of instruments which has been invented by Mr. Levi Disbrow, and to which our joint patent has given system, and extended usefulness, I felt much regret to see, in your number for March last, that the Journal had done itself, and us, and the subject, *injustice.* It seems to me that a discovery so interesting to the convenience, economy, and health of our cities, and an art so singularly fortunate for them, merited at least that the specification should have been correctly described. I think, indeed, that a provision of a nature so singularly advantageous, as tending to relieve us from one of the disadvantages incident to our deep alluvial soil, deserved at the hands of philosophical inquiry, a more thorough and candid investigation. It was indeed my intention, at my earliest leisure, to have asked your acceptance of an article on the subject. This I shall now do with all possible brevity, offering the apology to your Philadelphia readers, of my persuasion that, notwithstanding the proud achievment of the Fair Mount water works, the public will eventually believe that the *rock springs*, the waters of the *natural aqueduct* of the primitive *rock* descending from the Alleghenies, is *preferable for the table;* and that an abundant supply of it will prove to be a powerful auxiliary to the temperance societies, as it will supply a beverage requiring no foreign flavouring to counteract its unpleasant taste.

It gave me some surprise that the writer of the article should have sought to make an unfavourable impression of the practical usefulness of the essays made by the inventor of this art. If from the circumstance of obtaining overflowing borings in the *first four instances* he was led to hope for equal success in all other places, it was surely excusable, even if no satisfactory theory could be advanced to account for it. And to insinuate that his operations had been in some indefinite number of cases abandoned, or "suspended," after considerable expense, when but one instance of it could be named, (that of Alexandria,) while 100 instances of success have been *even published*, was surely *less liberal* than might have been expected of the *Franklin* Journal.

The Alexandria corporation obtained good water at ninety feet, where a bed of clay succeeded to coarse sand; but, desirous of an overflow, they decided to go through the clay, but stopt short of

it at 400 feet. It was unphilosophical to stop, as in 500 feet they would have reached the shelving rock, in all probability, and have had water enough for the whole city.

That there was reason to expect an overflow, is proved not only by the instances of it, but by the rising of the water so high in the tubes as to be higher than the contiguous ground. Thus in a boring on the highest point of the island of New York, at the botanic garden, the water stands at least eighty feet above tide, and twenty feet above adjacent grounds. So also in boring at the corner of Bleecher street and Broadway, the ground being fifty feet above tide, the rock forty-eight feet under surface, the boring 400 feet therein, the rise was nineteen feet above the surface of the rock. If, instead of this soil, the rock had been the surface, this perforation would have produced a copious overflow. The water actually rises higher than the ground of half the city.

The well known geology of the middle states suggests the obvious explanation. The primitive stratified rock of the Allegheny mountains slopes down, underlaying the secondary rocks, and appears to gain an *upward slope* on approaching the sea coast, as seen at the falls of our rivers. But in the latitude of New York, and New England, it continues to rise till it has *formed the Green Mountains.* There are two ranges through Massachusetts; the more eastern is granite, the east side of the west and intermediate valley in Berkshire, is *gneiss*, the third general formation described by Professor Eaton in his geological survey; and these strata appear to be remarkably productive of water. It pours out the sources of the Housatonic; and as it ranges southward between the Croton and the Broux, gives forth large springs that form their head waters in ponds, and continuing south is depressed under Harlaem river, and again rises to form the principal rough elevations of this island; it is then depressed 100 feet under the city and the Hudson, and, gradually rising as it underlays New Jersey, is found forty feet only under the soil in the Northern Liberties of Philadelphia, and is above ground at Baltimore.

Every boring into this rock has afforded this pure water, and in many instances even the approach to its surface has brought up a large supply. Mr. Disbrow has just finished in Baltimore one of this kind for the corporation in the *made land,* and another for an individual in the rock. There are in New York four in rock, and ten in earth, and the fact is demonstrable that the whole city can be better supplied in this way than in any other, even at half the expense of introducing the nearest stream. And a similar calculation might be made for the northern and southern liberties of Philadelphia, were they not already supplied.

The principle of our joint patent whereby any one boring is made to yield as much water as a steam engine of small size can pump; (that is, enough for 2000 families with a ten horse power, high enough to flow rapidly from a reservoir to the houses,) is founded as the specification expresses, in availing ourselves of the hydrostatic pressure, or velocity of discharge through orifices. Suppose the water stands 100 feet deep in the tube, and a pump is placed therein nearly as deep, and

the power reduces this head of water to eighty-one feet, the velocity of the water entering will be that due to this head, which is seventy-two feet a second. Now make any reasonable supposition that the water may not come as fast, yet if it comes fast enough to keep the power at work, a larger quantity will be raised than 2000 families require.

At one boring here, a six horse engine gave, experimentally, last summer, ninety gallons a minute. Another gives constantly with one horse power, twenty gallons a minute, (all the establishment wants,) and might raise 200 gallons a minute with a ten horse engine. In this instance the rock boring is 130 feet, the earth 74 feet, the rise of water to within fifteen feet of the surface of the ground, thus standing 189 feet deep.

To take off the stress which deep and strong pumping occasions to the lower lifting box, we have devised the expedient which you, by the article alluded to, have, it seems, not perfectly comprehended, in imagining that our pump box (as we have contrived it,) had valves opening *downwards*. I should really have thought, before so representing it, you might have been so kind as to have asked me, by letter, how this could possibly be.

The simple matter of fact is, that a series of boxes on the same rod, each having its chamber, divide the column, say into ten parts, each lifting ten feet of it; thus, though all have the bottom fixed valve in common, they constitute a succession of pumps one above the other, and might thus lift to any considerable requisite elevation, and cause the water to follow and rise in proportion to the depth of the draft, and the power employed. The mode of forming the boxes which we prefer is to cause an enlargement of the rod, in the shape of a bulb, to fit the bottom of the box, and let this play on the rod half an inch, to permit the water to pass through it, as this makes a very strong box; but they may also be fixed on the rod, and have fly valves above. The essence of the improvement is the series, dividing the weight of the column.

You thus perceive that the geological formation of these subterraneous aqueducts present our fortunate cities, seated as they are on deep sands, or clay, with pure water in abundance, beyond the influence of seasons, and the wants of population; that art has devised the means of reaching them, and that principles of science have made them available; presenting to men of capital and philanthropy, opportunities of benevolent and profitable investment in forming water companies.

And permit me here, briefly to mention the plan of financial operation we, as patentees of these improvements, propose—

1. For mechanic and professional services, the usual compensation.

2. For benefit, as patentees, one-half the surplus revenue, beyond interest—but at the termination of the privilege, our emolument ceases, and then the city authorities take our place, and are for ever entitled to this revenue, devoted to the support of charitable societies and institutions.

There are few considerable cities where this plan will not justify the forming of a water company.

With great respect and esteem, yours, &c.

JNO. L. SULLIVAN.

New York, 14 *May*, 1833.

Remarks by the Editor.

Notwithstanding the grave charges of our friend Sullivan, "our withers are unwrung." No willing, or known, "injustice" has been done in the article in our March number p. 176. If we thought it worth while to bandy charges of this description, we could find enough in the foregoing communication upon which to found the procedure; we shall not do this, however, because it would be a very profitless employment, and because we believe that Mr. Sullivan has mistaken our notice in several points which a more calm examination of them has ere now, probably, corrected, and which most of our readers will be able to correct, by comparing the said notice with Mr. Sullivan's letter. We gave, in the words of the patentees, their own account of their joint improvement, thus enabling our readers to judge for themselves. Upon reviewing the article in question we find nothing to retract, or to modify, or we would most cheerfully do it; we make some claim to candour, but none to infallibility, and can assure Messrs. Disbrow and Sullivan, that no one residing at the distance of two hundred miles from New York, will more sincerely rejoice in the perfect success of their undertaking than will the editor of this Journal.

Although we have determined not to make a long article of our present remarks, we will take a brief notice of some of the points alluded to by Mr. Sullivan. When speaking of the instances in which Mr. Disbrow had, after much labour, suspended his operations, we alluded, exclusively, to his former expectations of being able, every where, to obtain overflowing wells; and we are certain that Mr. S. will not say that Alexandria is the only place which offers an example of such failure, but that he will, on the contrary, confess that success to this extent has been comparatively rare. There are but few places where water cannot be found by digging, and, of course, by boring. We have, upon some very elevated ground in the city of Washington, wells with an abundant supply of water, at the depth of sixteen feet, and if Messrs. Disbrow and Sullivan had sent down the auger at the same spot, they would undoubtedly have succeeded at the same depth.

Where Mr. S. finds that we have spoken of, or alluded to, valves "opening *downwards*," we know not; one thing is certain, that such a thought never entered into our heads, and we presume, therefore, that it did not escape from the goose quill at the ends of our fingers; we had no inducement, therefore, "to have asked by letter how this could possibly be." We certainly, if time admitted of it, should gladly correspond with Mr. Sullivan, as we might thus have obtained

much useful information upon the point in question, as well as upon others; the pressure of our duties, however, has placed its *veto* here. It is a task of no small magnitude, to steal from the periods which ought to be devoted to exercise or repose, time enough to wade through the verbiage of all the patents granted in the United States; for although some few of the specifications are well drawn up, and present inventions, or discoveries, which are of great interest, many of them add extreme length to utter worthlessness in all respects. Although we have incidentally made this remark, it is not intended to apply to the case in question, but merely to show that without some very special reason, none of the six hundred persons who annually obtain patents in the United States, ought to look to us for any voluntary offer of a large portion of time; leisure we have none. Besides this, every specification should set forth, in "full, clear, and exact terms," the nature of the thing patented; if it fails in this point, it is not our business to seek, and indeed we think that we ought rather to avoid the obtaining of, any extraneous light.

FRANKLIN INSTITUTE.

Fourth Monthly Conversation Meeting.

Prof. Hare exhibited a new form of the syphon, intended particularly for transferring corrosive liquids from one vessel to another, but applicable to general purposes. A variety of different constructions of this instrument were upon the table, acting, however, upon the same general principles, that of the partial exhaustion of the vessel into which the liquid is to be transferred. We hope to place a detailed description of these instruments before our readers at some future time.

Mr. Jas. P. Espy showed a model illustrative of the apparatus contrived by him for enabling the escape of sparks from the chimnies of locomotive engines, steam-boats, &c. to be prevented. The device acts by increasing the draft, so that a covering of wire gauge can be applied to stop the sparks. Experiments of a favourable character were understood to have been made with this apparatus.

Mr. James M'Ilvaine explained a drawing of an apparatus devised by him for the same purpose with that just alluded to. The plan consists in taking advantage of the chamber into which the small flues in the boilers of Stephenson's locomotives empty, and from which the pipe for the escape of the smoke, &c. passes.

Prof. A. D. Bache exhibited a rack-wrench, made by Mr. Alfred C. Jones, steam engineer; he stated that this wrench had been used in miscellaneous work for more than a year. A description of this wrench is given in our present number.

Each subject, as presented, produced instructive conversation, in which the members, generally, took part.

Bibliographical Notice

The Elements of the Integral Calculus, with its application to Geometry, and to the summation of Infinite Series; intended for the use of Mathematical Students in Schools and Universities. By J. R. Young.

Mr. Young's algebra and differential calculus were entire and complete in themselves; they furnished full and satisfactory information concerning the subjects which they professed to illustrate. We had hoped that the integral calculus would be treated in the same manner, and that the genius of Mr. Young, and the enterprise of Messrs. Carey, Lea, & Blanchard, would place before the American student a library of Mathematical Science. Dr. Bowditch, who long since gave to the world the best Practical Navigator it has ever seen, is now, with a liberality unexampled in this country, enriching its literature with a better edition of the Celestial Mechanics than can be found in any other language. To peruse and to understand this great work must for years to come be the ultimate aim of the lover of analytical science, and the aspirant for scientific distinction; but while many may set out upon the race, but few will arrive at the goal, even aided as they will be by the ample commentary of Dr. Bowditch.

While this Grecian capital was nearly completed, the corner stone of the structure it was to adorn had hardly been laid. It is to the writings of Mr. Young, published and promised, that we are to look for the supply of these deficiencies. The treatise before us is modestly styled the Elements of the Integral Calculus.

We are convinced upon its perusal that no book of three hundred octavo pages could furnish more clear or more ample instruction on this interesting subject than Mr. Young's. If it is not complete; if any thing is left to be desired, it is not that a solitary page which he has written should be dispensed with, but that he should generously fulfil the promise he has given us in his preface to furnish the fifth and supplementary volume. He has referred us to the Complete Treatise of Lacroix, to Jephson's Fluctional Calculus, and to Garnier's Calcul Integrale, for more ample details on this subject; we thank him for this, but we find none whose style is so clear as his. We know of none who can make the most abstruse departments of analysis so intelligible and so interesting to their readers. We are pleased with his society—we do not wish to resign it yet.

We look with anxiety for the appearance of this supplementary volume. We hope that Messrs. Carey, Lea, & Blanchard will even go further, and republish Mr. Young's fourth volume on analytical mechanics. The knowledge required to prepare for this study will have been furnished in his first four volumes. Could a work on this last mentioned subject of the same high character be placed before the American student, through the American press, he might justly be proud of possessing at home the means of pursuing to the fullest ex-

tent to which it has hitherto been carried, the greatest and noblest study in which the human mind can be engaged.

In conclusion, we advise those who wish to obtain a knowledge of the calculus, to study these two volumes of Mr. Young. They are professedly written on the French plan; but while preserving all the excellencies of the French methods, Mr. Young has supplied a defect common to all—the want of examples. His work is richer in them than any we have seen, and many of the solutions are original. We are far from objecting to the work because its author did not give more attention to the ancient curves, the quaratrix, cissoid, &c. We have always thought that these curves occupied too much space in English works. They have lost their individual importance since the invention of the calculus, which enables us to include their properties, together with those of hundreds of others, in a few general formulas, which a scholar of ordinary acquirements may easily apply to individual curves at his own convenience.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN JANUARY, 1833.

With Remarks and Exemplifications, by the Editor.

1. For *Making Pads for Harness, &c.;* Silas Lamson, Sterling, Worcester county, Massachusetts, January 5.

A rod of iron bent into a curved, or crescent-like, form, is to have perforations at each end to receive the terrets, and attach it to the pad. The object of this contrivance is to keep the centre, or connecting part of the pads from the back and withers of the horse, so as by throwing the weight on each side to prevent injury to the ridge of the horse's back. This connecting rod may, it is said, be bent in any desired curve, and instead of iron, other metals may be used. There is no claim made, nor does one appear to be necessary in the present case, as nothing more is described than the thing intended to be patented.

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2. For a *Mode of affixing Sheet Iron, and other Metallic Plates, on the Roofs of Buildings;* Andrew Gondois, and John Swales, Petersburgh, Dinwiddie county, Virginia, January 5.

(See specification, p. 181, vol. xi.)

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3. For machinery for *Sawing and Rounding Staves;* Philip Cornell, Weedsport, Cayuga county, New York, January 5.

(See specification.)

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4. For an improvement in the *Temple used in Weaving*

Cloth; Peter Newel, Waterford, Saratoga county, New York, January 5.

The claim in this patent is to "the yielding motion of the jaws in the frame at every revolution of the lathe of the loom, which prevents the selvage threads from breaking. Also the motion of the bolt which raises the joint arm, and gives the receding motion to the jaws, and thereby prevents any injury to the reed."

The specification, with the aid of the drawing, would undoubtedly suffice to render the invention intelligible had there been "written references" to the latter, agreeably to the absolute demands of the patent law; as it is, the construction and operation of the thing are far from being plain; this difficulty would most probably be removed by an examination of the model, which is, unfortunately, too frequently relied upon, as though it made a part of the patent.

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5. For an improvement in making *Garden Hoes;* Charles H. Strong, and Edward A. Sterry, Norwich, New London county, Connecticut, January 5.

The improvement claimed consists in rivetting, or brazing, the eye on to the plate of which the hoe is formed, the hole being placed above the top of the hoe as in the old fashioned form; the shank of the eye is to be sunk its whole depth into the plate so as to leave the under surface smooth and even. This mode of making hoes, it is said, is less expensive, and gives them equal strength with those the plates of which are entirely forged out, whilst it admits of their being made of rolled steel.

A model, it appears, is deposited in the office, but a drawing was considered as unnecessary; an opinion from which we dissent altogether, for whenever a model can be made "the nature of the case admits of drawings," and they are then imperiously required by the terms of the law.

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6. For a *Reaction Water Wheel;* Hazard Lewis, Binghamton, Broom county, New York, January 7.

This reacting wheel is in form and substance like that of Calvin Wing, described at p. 85, vol. vii. to which we have very frequently had occasion to advert; and from some of the modes of expression used in the present specification, it is fairly to be presumed that the patentee had perused the former.

The wheel, we are informed, "may be made in whole, or in part, of wood, of wrought or cast iron, or any other suitable material." The floats are to be more numerous than usual, twenty-four being represented in the drawing. The claim made is to the "making the buckets of cast or wrought iron, and of increasing their number." The latter, it is said, places the discharging orifice more at the verge of the wheel, whilst the buckets being made shorter, and, consequently, the rim narrower, affords more room for water within the wheel.

The first point claimed has been so frequently relied on that it has become somewhat like a broken reed; and the second we appre-

hend will not brace it up, as we know of no limit to the number of buckets in the wheels formerly patented. But something must be claimed, and where there is little novelty, there is little opportunity for a choice.

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7. For an improvement in the *Wheels of Wagons and Carriages;* Isaac Van Gorden, Warren, Trumbull county, Ohio, January 7.

When, or by whom, the improvement here patented was *first* made we know not, but we are very certain that it belongs to "auld lang syne," as the claim will serve to show to those who are adepts; it is to "the principle of attaching each wheel to its separate axle or journal, made fast in the hub, and running the axles, or journals, in boxes attached to the axle tree bed." It has been before patented, but even this was done in its old age.

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8. For an improvement in the common *Fire Grate,* as patented on the 25th of October, 1832; James Atwater, New Haven, Connecticut, January 9.

The improvements now patented are described at great length, and illustrated by drawings upon five separate sheets. Referring to our notice of the former patent, we will now add an abstract of the new claims. Instead of the slide, or slides, to regulate the draught, there is now substituted as many valves, or covers, as there may be openings in the back or sides of the grate, from which substitution, it is said, all the advantages are derived which the former was designed to secure.

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9. For an improvement in *Grinding of Edge Tools, of all kinds, &c.;* Dan Welsh, Canaan, Grafton county, New Hampshire, January 10.

The object of this patent is the same with that of Mr. G. A. Madeira, whose specification was published in vol. x. p. 256; the arrangement of the apparatus, however, is different. The tool, or other article, to be ground, is to be held in a pair of tongs, which must be made in such form as to suit it. These tongs work on a swivel in a kind of frame work, which is attached to the frame of the grind stone, which frame is so formed as to swivel in all directions. The tongs have a wooden handle by which the piece to be ground is guided and pressed against the stone. Judging from the description, we are inclined to think that the instrument now patented is not so convenient as that described by Mr. Madeira.

The claim is to "the said method of grinding, and at the same time keeping the stone in a perfect round state."

The latter part of this claim must be considered as altogether superfluous, as it no more follows as a consequence of this mode of grinding, than of that before patented.

10. For a *Chlorine Cosmetic;* David West, city of Hudson, Columbia county, New York, January 11.

This cosmetic is to cure tetters, sores, pimpled face, ring worms, itch, and other cutaneous diseases; chlorine, as its name indicates, being the active ingredient. Gums, oils, animal fat, or resins, are to have chlorine incorporated with them, which is to be done by rubbing them up intimately with chloride of lime, or chloride of soda; or they may be charged with the chlorine by passing the gas through them, or otherwise. The best mode is considered to be the mixing together equal parts of olive oil and chloride of lime; but this may be combined with other articles agreeably to the following recipe.

Mix together four ounces of nitrate of quicksilver, and four of olive oil, and then add four ounces of chloride of lime. This will be further improved by one ounce of spirits of turpentine, or other essential oil, and half an ounce of essence of bergamot, or other aromatic. These are to be all ground together into an uniform mass. The composition may be varied, taking care always to employ the chlorine.

Should this cosmetic effect the good purposes specified by the patentee, we wish him, and doubt not he will meet, success in the sale of his compound. We think, however, that the use of chlorine as an ingredient in all the variety of combinations and mixtures of which it may make a part, cannot be appropriated by the patentee, although he may undoubtedly secure to himself any specific mixtures of his own invention. From the wording of the specification we think that it admits of a construction more broad than could be sustained in a court of law.

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11. For a *Washing Machine;* Easton Wilben, Sullivan. Madison county, New York, January 11.

A cylinder, which may be fourteen inches long, and twelve in diameter, is made to revolve in a trough, and has under it a concave of fluted rollers. The clothes to be washed are hitched upon pins projecting from the cylinder, this being borne down by spiral springs, to admit of its adapting itself to them. The claim is to the foregoing machine. There is about as much of novelty in it as usually falls to the lot of washing machines, and it would have been somewhat difficult, therefore, to have fixed upon any of its individual parts as subjects for a claim, excepting, it may be, the projecting pins upon which to hitch the clothes.

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12. For a *Platform Balance, or Weighing Machine;* Ira Gay, Barnstable, Hillsborough county, New Hampshire, January 14.

The novelty claimed in this weighing machine consists of a variation in the arrangement and number of the levers acted upon by the fulcra which support the platform. The patentee observes that in his there are but four levers, while in the machine ordinarily employed there are five.

Since the first invention of the platform weighing machine there have been various modifications adopted in the arrangement of the levers, with a view either to greater simplicity or increased accuracy. We cannot, without a drawing, exhibit that of the present patentee; judging from the evidence before us, we presume that it is quite as good as most of its predecessors.

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13. For a *Locomotive Steam Engine for Rail-roads,* denominated the Pennsylvania Locomotive; S. H. Long, Lieutenant Colonel of Engineers of the United States, January 17.

Without drawings we cannot give a competent idea of the various points of arrangement which are considered as new in the different parts of this locomotive engine and carriage. The specification occupies sixteen pages, independently of the references to the drawings, which require three more.

The improvements contemplated are intended to combine economy and efficiency, and are said to consist in the invention of machinery altogether new; of new modifications of machinery before known; and of combinations of machinery, both new and old, in a way not heretofore applied to locomotive steam carriages. Those parts, or combinations, which are considered as new being so designated in the course of the description, without being summed up at its end.

The wheel, besides the ordinary flanch on its periphery, is to have a second on the opposite edge of the tread, projecting inwards towards the hub; this flanch is incorporated with the spokes, and is intended to strengthen the wheel. The hub is to be cast tubular, its thickness must be as equable as possible, and the boxes which are to receive the axle are to be let into it, and secured by bolts passing through flanches prepared for the purpose. These points constitute a part of the novelties claimed.

The axles and their adjustments are to differ from those now in use. They are to be of a uniform size throughout, without journals, necks, or shoulders, and they are to be firmly connected to the wheels. Rings, or bands, are to be attached to the axles by pins, or screws, and are to turn in grooves which may serve as receptacles for oil; this arrangement is considered as new.

Wedge formed breaks, or convoys, are to be applied between the foremost and hindmost wheels, passing either upwards or downwards, the sides of them to be curved to adapt them to the wheels. There is nothing new in this part, such breaks being used upon the Baltimore and Ohio, and other rail-roads.

The boiler is to be cylindrical, and is to stand on its end; at its upper extremity it is to be terminated by the frustrum of a direct cone. The boiler is described in the Franklin Journal, for 1827, with other improvements, the invention of Colonel Long; as it now appears, however, it is somewhat modified, though not materially altered. A casing of sheet iron surrounds the boiler, and serves as a flue to conduct off the smoke and heated air; from opposite sides of this casing two

flues pass off and unite in one vertical chimney; this chimney is made to work on tubular swivel joints so that it may be lowered to pass under bridges or through tunnels; these joints are viewed as new.

The bars of the grate are formed of sheet iron, the section of them being somewhat like an inverted U, closed nearly together at the edges; the hollow space is to be filled with fine clay; this and some other points in its arrangement are also claimed as new.

The steam cylinders are to be two in number, placed horizontally; they are to receive their supply from the same steam chest, each having a slide valve for that purpose. These two cylinders, with a steam chest, in common, is said to be new. The cams and cam rods for operating upon the valves, are also considered as new in principle.

The manner of constructing the carriage is next described, and "the relative disposition of the connecting bars, the axles, and the steam cylinders, together with their several adjustments, are believed to be new."

The safety valves are constructed on a principle devised by Chas. Wetherill, Esq. of Philadelphia, modified, however, in a novel manner, by the patentee. It is designed to prevent a counter current of steam from acting upon the upper surface of the valve, and pressing it down so as to impede its action.

The principle of causing a current of steam to be forced on ignited anthracite to promote its combustion, as devised by Mr. Wetherill, is also applied in a way which is particularly described; the consent of Mr. Wetherill to the adoption of the improvements having been obtained. This last part, we presume, is not considered as forming any part of the patent, as no exclusive right has been acquired therefor by Mr. Wetherill, and he must be considered as having abandoned to the public any right which he may have possessed.

The drawings which accompany the specification give a clear exhibition of the arrangement of the whole machinery, which is ingenious and compact; we are apprehensive, however, that there is not a sufficient surface exposed to the action of heat to keep up the requisite supply of steam; and that the common objection arising from the packing down of the anthracite, by the continued vibration on a rail-road, will interfere with the efficient action of that fuel.

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14. For an improvement in *Machines for Spinning Cotton;* John A. Bradshaw, Foxboro, Norfolk county, Massachusetts, January 18.

In arrangement there is certainly some difference between the spindle which is the subject of this patent, and others previously patented both here and in England, but in principle we cannot discover the slightest. There is a dead spindle with revolving flyers, the spindle is raised and lowered by means of a wave rail, in the usual manner, and it consists of three parts; the lower part reaches up to the lower end of the bobbin; this is drilled down to the depth of five or six inches, to receive a wire which is adapted to it; upon this wire, which projects some inches above the lower section of the spindle, is placed the upper section, drilled also for that purpose; and upon this

the bobbin is to be placed. The whirl and shaft of the flyer, which revolves freely on the spindle, is driven in the usual way. Those who are acquainted with the recent improvements in spinning will at once perceive the identity of action in this and some other spindles.

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15. For *Cast Iron Hubs for Wheels;* Carver Washburn, Bridgewater, Plymouth county, Massachusetts, January 18.

This patent is taken simply for the insertion of ferules, or boxes, of metal of a suitable composition, within the ends of cast iron hubs, and the confining them there by screws. The boxes, it is observed, may be renewed when worn, and that they thus remove the objection of the wearing out of cast iron hubs by the friction of the axletree.

Would not a better mode of removing this objection be the case hardening of the axles? It is well known to mechanists that cast iron and hard steel run with less friction than most other metals, and that lathe collars of cast iron, with hard steel mandrels, wear as little, or less, than hardened steel when used for both.

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16. For an improvement in constructing *Cars for Rail-roads;* Jonas P. Fairlamb, city of Philadelphia, January 10.

In this car the wheels are to be conical, in the manner of those for which a patent was obtained by Mr. James Wright of Columbia, Pennsylvania, in September, 1829, the specification of which is published in vol. iv. p. 272. Mr. Wright's invention consisted in the combination of a cone on the tread of the wheels, with a capacity of vibration in the axle, to allow of their adjusting themselves to the radius of any curve upon which they may run.

If Mr. Wright's patent is valid, the law will not admit of the present patentee making use of it, even if he has made a real improvement in the mode of applying it.

In the self-adapting rail-road car, with conical wheels, the axle must be allowed to vibrate as above noticed, and Mr. Fairlamb's invention consists in a mode of supporting the ends of the axles in vibrating boxes on the frame of the car. The journals project beyond the wheels, and run in vibrating boxes, which are segments of circles, of which the middle of the axis is the centre. The boxes bear against two or three horizontal conical friction rollers, and against two which are vertical, so as to allow of an easy lateral motion; the arrangement appears to be a good one, but still it is altogether only subservient to the action of the conical wheels, embraced in the patent of Mr. Wright.

The claim is to "the construction of the above boxes, rollers, and circular plates, or rings; and all other parts of the above mentioned and described car not heretofore used or known."

Since the foregoing notice was written a long depending suit between Mr. James Wright and the Baltimore and Ohio Rail-road Company has been brought to an issue in the Circuit Court of the United States, and the validity of Mr. Wright's claim has been fully sustained by the jury. It is probable that the case will be carried up

to the Supreme Court by the defendants; in the mean time those who use the combination will do so at their peril.

How far Mr. Fairlamb, or any other person, has a right to use journals which project beyond the wheels, is a point which also admits of doubt. By turning to p. 135, vol. ix, it will be seen that on the 20th of July, 1831, Mr. Ross Winans obtained a patent in which he claims the "extending the axles each way outside of a pair, or pairs, of wheels, far enough to form external gudgeons to receive the bearing box of the loaded body."

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17. For a *Screw Puppet, or Throttle, Valve;* Edward A. G. Young, New Castle, New Castle county, Delaware, January 19.

This may be an improved construction of the throttle valve, but we doubt it. A conical puppet valve is substituted for the common throttle valve; above the valve there is a cap through which a stem rises, which is to raise and lower the valve. The stem has a screw on it working in a nut, and the arm from the governor operates upon a pinion which turns the stem, and raises or lowers the valve. The stem, of course, must swivel in the valve.

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18. For a *Rotary Steam Engine;* Charles R. Alsop, Middletown, Middlesex county, Connecticut, January 21.

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19. For a *Rotary Pump;* Charles R. Alsop, Middletown, Middlesex county, Connecticut, January 21.

The patentee promises a particular account of the operation of these engines, which, when received, we shall publish at large.

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20. For an improvement in the *Manufacturing of Sugar;* Guy Duplantier, Baton Rouge, Louisiana, January 21.

The patentee says that he thinks he has fully attained the desired object of clarifying the juice of the cane. His process consists in neutralizing the acid contained in the juice, by the aid of lime. When the liquid becomes thick, or muddy, chalk, or Spanish whiting, is to be put into it, which accomplishes the precipitation of the feces, or lees. To promote the precipitation we are told that sulphuric acid may be used, but that this is not absolutely necessary. There is no claim made, and the foregoing comprises the sum and substance of the specification.

We have so often read and written about neutralizing the acid formed in cane juice, by the addition of lime, that we little dreamt of a patent for so doing. Perhaps, however, there may be something new in the foregoing prescription, although it is too sublimated for us.

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21. For an improvement in the mode of *Caking Sugar;* Uriel Smith, Sandisfield, Berkshire county, Massachusetts, January 21.

We are somewhat in the dark about the business of *caking sugar,*

and find nothing to enlighten us in the specification; we have concluded, however, that the design is to form maple sugar into cakes in a way more convenient than that hitherto employed. The moulds, it seems, are to be made square, of wood, or metal, and are to be arranged in a square frame. Their sides are to be sloping, that the cake, when formed, may be the more readily removed. This is all we can gather from the description, and lest we might plunge into some fatal error upon the subject, we shall leave all further inferences to be drawn by those who may choose to occupy themselves in this matter.

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22. For a *Machine for Making Laths;* Orange H. Dibble, Evans, Erie county, New York, January 22.

A knife, as long as the lath to be cut, is fixed to a beam, which may be made to vibrate by a crank motion. Pieces of board, as thick as the intended width of the lath, are cut into proper lengths, and fed to the knife through a groove. The edge of the board comes against a suitable bearing, and every time the knife is brought down, it cuts a lath, which falling, makes room for the board to advance. There is no claim made, and as laths have been cut from plank upon the same principle, although by machines somewhat differently arranged, we are unable to tell what part is considered as new.

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23. For a *Machine for Napping Cloth;* Eliakim Benham, Roxbury, Delaware county, New York, January 22.

Two cylinders are to be covered with napping cards, and placed in a frame so as to be parallel to, and at a suitable distance from, each other. The cloth passes under pressing rollers, which bear it down on the napping rollers. On each side of the pressing, there are conducting rollers, to guide the cloth and to keep it strained. Beneath the napping rollers there is a cleaning roller, which is made sufficiently large to touch both the former, and being covered with fancy cards, serves to clean them. The frame, wheels, whirls, &c. for supporting and driving the machine, are figured and described. In addition to the cards on the rollers, there is a moveable card placed upon springs, which bears upon the cloth, as it is about to wind on the rollers which receive it after being napped; this is for the purpose of laying the pile smooth.

The claim is to the foregoing machine, "and particularly to the napping and pressing cylinders, and the moveable card."

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24. For a *Felt Washer;* William Cole, Lee, Berkshire county, Massachusetts, January 23.

The felt washer here described consists of a wheel carrying four rounds, like those of a reel. The length of the wheel must be equal to the width of the felt, against the lower side of which it is made to revolve in a direction the reverse of that in which the felt passes, the rounds bearing forcibly against it. A tube of tin, or other metal, is

placed on the side of the felt opposite to the revolving washer; a row of holes, contiguous to each other, is made along the side of the tube which presses against the felt, and water being let into this tube, it is discharged through these openings upon the felt. This arrangement, the patentee says, will serve to keep the felt perfectly clean until it is worn out.

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25. For a *Tread Wheel for applying Horse Power to Machinery;* Alanson Coats, Truxton, Courtland county, New York, January 23.

This, it seems, is to be a two horse, one horse, power machine; the patentee telling us that on looking at the thing it will be seen that it "practically demonstrates the double purchase principle, by which one horse is enabled to perform the labour done by two in the ordinary way." Although we frequently meet with machines in which their inventors can clearly see the demonstration of such a principle, we uniformly experience, whenever we approach them, that entire *obfuscation* of mind and vision, which prevents us from seeing "what is not to be seen." We were not born in "the land o' cakes," and never, therefore, enjoyed the privilege of second sight, and following, pretty closely, though nonjuringly, the rules of the Temperance Society, we rarely see double.

A vertical shaft, with a sweep to which the horse is to be attached, is made in the usual way. This shaft is to be of iron, and is made round; and a hollow, or tubular, shaft is made to pass over this, which must extend up to the height of four or five feet. The platform upon which the horse is to walk extends out from the lower end of the hollow shaft; between the lower end of this, and a shoulder, or collar, upon the lower end of the inner shaft, there are friction rollers, to enable them to turn freely, in reversed directions. Under the platform there is a cog wheel, the teeth of which project downwards, and below it there is a similar wheel on the inner shaft, the teeth of which project upward; these wheels may be nine or ten inches apart, and between them there is a trundle head into which both the cog wheels mash, and operate upon it as they revolve in opposite directions; from the horizontal shaft of this trundle the motion is communicated

The patentee "only claims as new such parts of the machine as are particularly described; including the shafts, and the manner of applying them (with the wheels) to the purposes of propelling machinery; together with the principles upon which a double purchase is founded, and the result acquired."

The only principle which we could apply to obtain a double power by this machinery, would be to get a horse of double the strength of those used by others; and this we might presume to do without a patent right, although the act might involve a "double purchase."

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26. For a *Double Cooking Stove and Fireplace;* Thomas M'Carty, Elmira, Tioga county, New York, January 23.

This is a cast iron cooking stove, with two laps, there being a fire-

place on each side, with a single plate partition between them. In winter, or when much cooking is to be done, both fires may be lighted. There are the usual openings for kettles, flues, &c. The claim is to "the making of a double cooking stove and fireplace, with the top cast in one piece; the sides cast with projections very low in them, to receive boilers; and the oven in front, cast whole." Qu. Will this save fuel?

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27. For a *Polyshare;* Frederick Brewster, Burlington, Chittenden county, Vermont, January 24.

The instrument called a *Polyshare* is, in form, like that kind of harrow called a cultivator, and the letter A will serve very well to represent the form of its frame. Five, or any other convenient number of shares are to be fixed to the frame, one at the front angle, and two at each side, just as the teeth have been heretofore fixed in similar machines. A leading beam extends forward from the front, and is made capable of being raised and lowered, to regulate the hold of the shares.

The patentee says he is aware that harrows, made very much like his polyshare, have been in use, but that he is not aware that those of them which have been made with flat, thin teeth, have had them so wide as the bottom of his shares, or that they have been furnished with a leading beam, and that he therefore claims these as his invention.

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28. For a *Double Stove for heating apartments;* John Dunley, Richmond, Henrico county, Virginia, January 24.

An iron stove, round, square, or of any other form, is to be made in the usual way; this is to be completely surrounded by an iron casing, leaving a space of an inch, or more, for the circulation of air. By a pipe leading into this air chamber through the lower part of the casing, cold air is to be admitted, which, when heated, is conducted through a pipe at the upper part, to any place required. The whole affair is claimed.

The heating of air, and the conducting it through tubes upon this principle, are things which have been so long known and so extensively practiced, as to render a patent for them of about the same value with the majority of those which are obtained. It is surprising that any one whose attention has been in any degree turned to the subject of conveying heat, should suppose such a contrivance new.

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29. For an improvement in the *Method of Generating Steam;* Joseph Truman, of Bridgeport, and James Cook, of Luzerne, Fayette county, Pennsylvania, January 24.

The claim made by these patentees is to "the use of more than one tier of boilers." In the drawing, three tiers are represented, consisting of four cylindrical boilers, or large tubes, arranged side by side. At a little distance above these are four others, and these are surmounted by a third row. The sides of the boilers in each tier are

connected together, and there are tubes of communication between all the boilers.

The fire being made under the lower tier, the flame and heated air return through the space between this and the next tier, and in like manner between that and the upper tier; all the lower boilers are to be kept full of water, but the upper ones only partially so, as with these the steam pipe is connected.

This is, in fact, nothing more than a tubular boiler with large tubes, not offering any thing new in principle, or even in arrangement; the plan, moreover, is attended with much danger, from the impossibility of keeping the lower boilers full of water.

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30. For a *Mode of Opening, Closing, and Fastening Window Blinds;* Edwin Keith, Bridgetown, Plymouth county, Massachusetts, January 25.

The contrivance here patented is intended to enable a person to open and close blind shutters, and to cause them to stand at any angle required, without the necessity of raising the window sash. Upon the lower end of the hinged side of the blind, a toothed circular segment is to be firmly fixed, the hinge joint, or pin, being the centre of the circle. An iron shaft which passes through the window frame has an endless screw on its outer end, the threads of which take into the toothed segment. By turning this on the inside, the blinds may be opened and closed at pleasure. The claim is to this mode of effecting the object, with the variations of which it is susceptible.

The only objection which we perceive to this plan, is, that, in windy weather, the force upon the segment will be very great, in consequence of its nearness to the fulcrum. To obviate this objection it would be necessary to make it inconveniently large.

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31. For a *Press for Pressing and Re-pressing Cotton;* Philenzo Payne, and Joshua Rundell, Claiborne county, Mississippi, January 25.

This press is intended to pack two bales at the same time, by the action of two levers operating upon the principle of the toggle joint. A strong frame is made by taking two pieces of timber, each forty feet long and about twelve by twenty-four inches square, and connecting them by cross pieces, allowing them to be the length of a bag (four or five feet) apart. A piece of timber, called the carriage, is used to act on the toggle joint levers; this slides through mortises made in the middle of the side pieces of the frame. There is a rack upon the carriage into which a pinion works for the purpose of moving it backwards and forwards; the power of a horse, or of any number which may be required, is to be communicated to this pinion. The two levers which are to press the cotton are attached by one end to the extreme end of the carriage; and by the other, to followers sliding within the frame; these levers are each about sixteen feet long. When the pinion is made to act upon the rack, and to draw the carriage

through the mortises in the frame, the levers cause the followers to advance until they are brought into a line with each other.

There are, of course, the requisite boxes, and other appendages, necessary in the cotton press, which need no description. Two frames, such as we have described, are usually placed side by side, the same carriage passing through both, and the same rack and pinion operating upon them. In this case, when one pair of levers is being brought up, the other pair is released, to remove the packed bales.

The press, as we have described it, has the carriage and its levers working horizontally; and in this case, a long slot, or mortise, of twenty feet, must be made through the outside timber, for them to work through; but the carriage may be placed vertically, and slide through a cross piece connecting two vertical posts rising from the sides of the frame. The levers, when up, will then assume the position of two rafters, supported at their junction by a post.

The patentees say, "we do not claim the discovery of the levers, nor the machinery, as we wish it understood here that this is an improvement on an original patent; but we here claim the application of the toggle levers worked in the different positions above described, in pressing and re-pressing cotton."

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32. For a *Cooking Stove;* Theodore Buddington, Bridgeport, Fairfield county, Connecticut, January 25.

This stove is to have a fireplace like that of an open grate; immediately above the fire there is to be an oven with its door; on each side of this are to be projections to receive kettles, &c.; there are also to be flues and other requisites. As to the point of novelty nothing is said, and all that we know about it is, that it is a patent stove, but which is the patented part we cannot tell, any more than the learned doctors of the Koran can designate the part of the pig which renders it an abomination to the Musselman; like the faithful, therefore, we must abstain from the whole, or pay for the indulgence.

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33. For a *Mill for Grinding Paint;* Silas Watrous, Groton, New London county, Connecticut, January 26.

This paint mill consists of a cylindrical stone, running on a shaft like a grind stone, and of a concave bed stone passing nearly one-third of the way round it at its lower part. The mill is merely described, nothing being said about the portion of it which the patentee has invented. The only novelty which we find in the description is the information given to us by the patentee, that "the mill stone runs in a bed stone made *convex*," and even this part we have taken the liberty of reversing in the foregoing notice, as it really appears to us that the periphery of a round mill stone, must, if it runs in any thing, run in a concave.

We could point out twenty books in which such a mill is described and figured.

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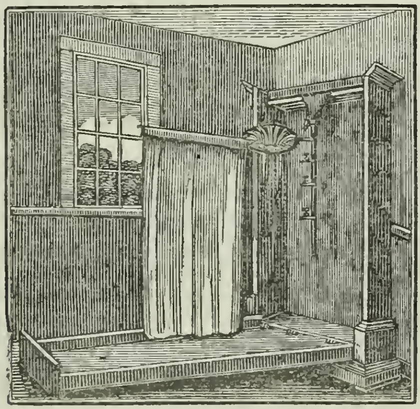
34. For a *Shower Bath Apparatus;* Joseph Ehrenfried, and

Henry Bachmann, Lancaster, Lancaster county, Pennsylvania, January 26.

A case like a wardrobe is made to close by a door, which, when the apparatus is used, falls down and forms the floor, or trough, on which the bather stands. The top of the case forms the cistern or reservoir for water, and from this a pipe descends which may have half a dozen cocks in it, one above the other, either of which may, of course, be turned on at pleasure. Branch pipes of different kinds are to be attached to these cocks; one, for example, may be in the form of the nose of a watering pot; another is a tubular hoop, perforated by small holes all around the inside of it, and within which the bather is to stand; a tube bent in the form of the letter U inverted, and perforated in like manner, may extend from head to foot of the bather.

Its general appearance will be explained by the annexed cut.



The whole affair is considered as new, and its virtues and conveniences are highly commended by the inventors. One of these gentlemen is, it appears, a citizen of the United States, the other has made a declaration of his intention to become such; now as the law of July 13th, 1832, extending the right of obtaining patents to persons of that description, imposes conditions to which the citizen is not subjected, should the former not comply with these conditions, what will become of the demi-right of the latter?

35, For a *Rotary Steam Engine;* Ethan Baldwin, city of Washington, D. C., January 28.

It is rarely the case that among the numerous attempts which are made to construct a rotary steam engine, there is any thing essentially new, either in principle or arrangement: the instance before us affords no exception to the foregoing remark, as the machine here

proposed does not present any thing which renders its successful operation any more probable than that of many of its predecessors, some of which strongly resemble it in its mode of action.

A wheel with a flat periphery is to revolve vertically upon its axis; three or more valves are to shut into excavations in this wheel, in such a way as when closed to make a part of its cylindrical surface; a steam case, or box, is placed on the upper part of the wheel, and this box must be of sufficient length to embrace two of the valves. The sides or edges of this box are to fit the wheel precisely, and these may be packed in any way which will render them steam tight; the valves, when raised, are to fit steam tight against the three sides of this hollow cylindrical box. A weighted lever, or bar, is to press upon the top of the box, and keep it in contact with the wheel.

There is, of course, to be a pipe for the admission of steam, a contrivance for opening and closing the valves, and the other usual appendages to such machines. There is no claim made, nor any intimation given which can lead us to a knowledge of what the patentee has invented; but as we are fully convinced that this instrument will not supersede the ordinary reciprocating engine, or in any way fulfil the expectations of the gentleman by whom it has been devised, the omission of a claim does not appear to us a matter of much importance.

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36. For an improvement in the *Currying Knife;* Thomas C. Barr, Clarke county, Kentucky, January 28.

The patentee tells us what is to be the length, breadth, and thickness of his knife, and how it is to be tempered, and this is all that his specification contains; it is fairly to be inferred, therefore, that any deviation in these particulars will leave his patent untouched. As there is some novelty in his mode of tempering, we will give it, that those who are adepts may discover its utility, a thing which we are unable to do, although not entirely ignorant of the means usually followed in preparing instruments of steel.

The knife, of cast steel, is to be heated to a cherry red, and then dipped endwise into *boiling water*, where it is to remain until it cools; after this it is to be held over *a furnace* two inches above the coals, until it is drawn down to a tough wire temper. What is meant by "a tough wire temper," and how it is to be known when this is attained, are points on which we are uninstructed by the patentee; we suppose, however, that he means one which will just bear to have a wire edge turned on it, such as a currying knife requires.

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37. For an improvement in the *Preparation of Gold and Silver, or other Ores* which require to be pulverized; Adam Carson, Kingston, Wayne county, Tennessee, January 28.

Two iron rollers made like flatting mill rollers are to revolve under a hopper, into which the hard stones containing gold are to be thrown. These stones, the patentee says, may be reduced to an impalpable powder by forcing the cylindrical rollers to run in contact with each

other; or a less degree of fineness may be attained by allowing the thickness of a knife between them.

We strongly suspect that smooth rollers of this description will refuse to take flint, and other hard stones between them, and are quite sure that the *impalpable* powder produced by them will be much more tangible than the "thick darkness which might be felt." Rollers of this kind, to take hold of stones, &c. must be furnished with flutes or asperities of some kind. Such rollers have been frequently employed for the purpose of crushing various substances.

We ought to mention that a riddle, or sieve, is to be placed, and agitated, under the rollers, to separate the palpable from the impalpable parts of the crushed stone or ore.

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38. For an improvement in the *Art of Distilling;* Simeon De Witt, Albany, New York, January 30.

The improvement here claimed consists of a condenser, or refrigerator, constructed in the following manner.

An indefinite number of small tubes, of equal lengths, are to be soldered at their ends into two circular or other formed heads, perforated to receive them; they are to be placed at a sufficient distance from each other to allow of the circulation of water completely around their outer surfaces. The most favourable construction will require that the tubes shall be no larger in diameter than shall suffice to allow the vapour which is to be condensed to pass readily through them, as it is thus forced into more immediate contact with their surfaces. The whole body of tubes, with their plates is to be enclosed within a cylindrical casing, or drum, which is to extend above and below the plates, allowing a space for the introduction of the vapour, and the passage of the condensed liquor. A cap covers the upper part of this condenser, and communicates by a tube with the boiler, or still, and the space below receives a tube to carry off the condensed liquid. From a reservoir above the condenser, a cold water tube enters the exterior case just above the lower plate, and on the opposite side the water which has circulated among the tubes escapes through a discharge pipe.

The patentee enters into calculations to show the power of his condenser when compared with that of the ordinary worm, the result of which is, that this condenser, containing 253 tubes, of twelve inches in length, and four-tenths of an inch in diameter, will be equal to that of a worm of two inches in diameter, and thirty-three feet eight inches in length.

The patentee states that in the year 1823 he constructed a condenser of concentric tubes, or cylinders, with small spaces between them, the steam and water passing through alternate intervals, and that he considers this as a modification thereof. It is demonstrated that in a condenser of this description, with tubes twelve inches in length, and having its outer cylinder thirteen inches in diameter, there being altogether twenty-two concentric tubes, the effect produced is equal to that of a worm two inches in diameter, and fifty-two

feet four inches long. By making the condenser two feet long, its power would be doubled.

The claim made is to the application of the principle stated in the specification, and to the results of the calculations founded on them, in the construction of distilling apparatus of a given power, by which they are compressed into the smallest possible compass, by causing the vapour to be condensed to pass as nearly as may be along the condensing surface, whether this be done by tubes of small diameter or by concentric tubes with small spaces between them; and also the described manner of constructing the said apparatus.

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39. For a machine for *Drilling the Eyes of Axes;* Milton Dexter Whipple, Douglass, Worcester county, Massachusetts, January 31.

This appears to be a well arranged machine, the object of which is the making the eyes of axes perfectly true, and of a size, by means of a drilling or boring apparatus of a peculiar construction. The patent is taken for the machine *as described*, the idea of boring, or drilling the eyes not being considered as new. The patent taken by Benjamin Smith, on the second of November last, is, in part, for an apparatus for drilling the eyes of axes, but the two do not resemble each other. As the present machine is complex, and dependent altogether upon its peculiar construction, it would require an engraving for its clear explanation.

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40. For an improvement in the construction of the *Machine for Making Clapboards;* Daniel Newton, Dalton, Coos county, New Hampshire, January 31.

We must, in relation to this apparatus, make short work of a long story; the patentee having described his machine in all its lengths, breadths, and thicknesses, without informing us which of its parts constitute the improvements. The clapboards are to be sawed by circular saws, there being a carriage to sustain and move the log to be cut; an apparatus to cause the clapboards to have the proper slope, from their thick to their thin ends, and many other things which must, at present, remain unmentioned. There are a number of machines for the same purpose, with circular saws, and other appurtenances in common with this, there being little or nothing in it which could be properly made the subject of a patent, with the exception of the peculiar combination and arrangement of the parts.

Specifications of American Patents.

Specification of a patent for an apparatus for smoothing and rounding Staves of all descriptions, being an improvement on the machinery for sawing and jointing staves formerly patented. Granted to Philip Cornell, *Weedsport, Cayuga county, New York, January* 5, 1833.

To all whom it may concern, be it known, that I, Philip Cornell, of Weedsport, in the county of Cayuga, and state of New York, have invented an improvement in the machinery for sawing and jointing staves, for which a patent was granted unto me on the eleventh day of April, in the year one thousand eight hundred and thirty-two; which improvement, however, may be used independently of the apparatus described in the specification of that patent, either alone, or in combination with other machinery for preparing staves. And I do hereby declare that the following is a full and exact description of my said improvement.

The apparatus which I am about to describe I have substituted for that represented as figure 4, in the drawing accompanying my patent for machinery for sawing and jointing staves, above alluded to; and when conjoined with this apparatus it serves to form and smooth the outside of the stave, whilst it is being sawed, and is yet on the block.

In a suitable frame I place an upright spindle of iron, or other metal, the lower end of which runs in a step, fixed for the purpose, and the upper end on a centre, or in a collar, adapted thereto. This spindle I drive by means of a whirl and band connected with other parts of the machinery. Near the top of the spindle, and at distances from each other equal to the width of the widest stave to be dressed, I fix two wheels, or discs, the spindles passing through holes in their centres, and being firmly attached to them. These wheels, or discs, may be five or six inches in diameter, or of such other size as may be preferred. To the edges of these I attach one, two, or more knives, or cutters, extending from one to the other, said knives curving inwards towards the spindle, so as to adapt them to the curvature of the stave. When a rapid motion is given to these knives, they will dress the stave perfectly true and smooth.

Instead of the wheels, or discs above described, arms may project out from the spindle, to which the knives may be attached by screws or otherwise.

What I claim as my invention, and for which I ask a patent, is the application of a knife, or knives, constructed and operating upon the principle herein described, to the smoothing and rounding of staves of all kinds, either as they are being sawed and are yet on the block, or otherwise.

Philip Cornell.

¶ List of French Patents.

A List of Patents for Inventions, Improvements, and the introduction of Foreign Inventions or Improvements, granted in France during the second quarter of the year 1831.*

[TRANSLATED FOR THIS JOURNAL.†]

Archbald, of England, represented at Paris by M. Bloque, April 2nd, (15 years.) A direct method of obtaining crystallized sugar from the juice of the cane. (P. Invent.)

G. Aubergier, apothecary, Clermond Ferrand. A machine for making grooved bricks. (P. Invent.)

P. L. Beauduceau, mechanician, Paris, April 27th, (15 years.) A hydraulic wheel, for raising water to the height of its axis; moved by horses walking in the interior of a wheel. (P. Invent. Improv.)

C. Beaumont, surgeon, Paris, April 14th, (5 years.) An apparatus which he calls a hydrostatic moderator, for regulating the effect of divers moving powers. (P. Invent.)

Ol. Benoist, farmer, at Plailly, represented at Paris by M. Armanville, April 2nd, (5 years.) A harrow called a trycicle harrow, furnished with three wheels. (P. Invent. Improv.)

M. Bétoulle, land surveyor, at Limoges, represented at Paris by M. Armonville, Secretary of the Conservatory of Arts and Trades, April 13th, (5 years.) An instrument furnished with telescopes, and intended to measure distances without the aid of a chain, which instrument he calls a telegraphic cross-staff. (P. Invent.)

L. Brunier, architect, Paris, April 27th, (15 years.) A hydraulic machine, called a continual hydromotor. (P. Improv.)

Brian, Donkin & Co., mechanical engineers, London, represented by M. Sauvage, at Arras, May 7th, (5 years.) An improvement in the machinery for manufacturing paper. (P. Import.)

J. L. Cabias, curate at Potigny, May 21. A method of executing certain pieces on the organ, without any knowledge of the instrument. (P. Invent.)

J. C. Chabert, Paris, May 19th, (5 years.) A chimney with a fire place movable at will, or the art of saving the greatest possible quantity of heat. (P. Invent. Improv.)

G. Cipeyre, wheelwright at Nimes, represented at Paris by M. Arnaud, May 19th, (5 years.) A machine with an *ompholienous* wheel, impelled by human hands, by means of two handles acting alternately; adapted to the spinning of silk. (P. Invent.)

J. C. Clave, mechanician at Sadan. May 19th, (10 years.) A ma-

* In the following list P. Invent. denotes a patent for an invention. P. Invent. and Improv. a patent for invention and improvement. P. Improv. a patent for an improvement. P. Import. a patent for the importation, or introduction of a foreign invention. P. Import. Improv. a patent for introduction and improvements. P. Invent. Import. a patent for invention and importation.

† At the request of the Committee on Publications.

chine by him called hydro atmospherical; applicable to every kind of moving power. (P. Invent.)

Cl. Compagnot, a maker of wooden shoes, Paris, April 14th, (5 years.) A new kind of shoe, rendered impervious to water by a thin piece of cork placed between two leather soles. (P. Invent.)

Couleaux & Co., Molsheim, May 19th, (10 years.) Improvement in the making of coffee mills. (P. Import.)

G. F. Courboulis, principal of a boarding school at Vouziers, Department of Ardennes, May 25th. A method of reading and spelling, which he calls Ardennesian. (P. Invent.)

C. P. R. Dalmenasse, Paris, May 10th, (10 years.) Improvement and addition to the patent obtained the 28th November, 1829, by Viriaud, jr., whose right he holds. System of carriage which he calls, *by impulse.* (P. Improv.)

P. F. Delacroix, manufacturing chemist, at Rouen, May 3d, (10 years.) A chimney apparatus called *multiplier*, calculated to distribute heat in adjoining and upper apartments. (P. Invent.)

A. G. Demilly, Paris, May 7th, (5 years.) Cast iron vessels, which he calls *heat bearers*, for heating the external air by means of a peculiar mechanism. (P. Invent. Improv.)

C. A. Dronsart, Neuilly, near Paris, June 30th, (5 years.) Method of manufacturing a stuff called by him Philippine, for hats, hangings, &c. (P. Invent.)

P. R. Duchesne, umbrella manufacturer, Paris, May 30th, (5 years.) Two different applications of a system of eccentric umbrellas and parasols. (P. Invent.)

Enn. Felissent, Lyons, June 30th, (15 years.) An apparatus for desiccation, by means of heated air, by direct contact with fire. (P. Improv.)

T. D. Francfort, Paris, April 27th, (15 years.) A process for laminating alloys of copper, and tin, and brass, so as to make brass sheathing for ships. (P. Improv.)

L. A. Gautier, apothecary, Havre, Mav 21st, (10 years.) A new process for making beer. (P. Invent.)

C. Gouche, merchant, Paris, May 19th, (10 years.) Composition of a starch which he calls, Prussian economical blue starch, to be used in dressing linen, muslin, lace, &c. (P. Invent.)

A. J. V. Gros, Paris, May 21st, (5 years.) A method of painting on hair cloth.

¶ TRANSLATIONS FROM FOREIGN JOURNALS.

*Description of the different kinds of Siphons.**

[TRANSLATED FOR THIS JOURNAL.†]

The siphon is a bent tube, with legs of unequal length, used for transferring liquids from one vessel to another. This instrument,

* Journal des Connaissances Usuelles, No. 92.

† By request of the Committee on Publications.

when once put in operation, is self-acting. The methods of putting it into operation have given rise to a variety of modifications in the form of the instrument, which we purpose now to notice.

Fig. 1.

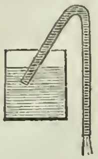


Fig. 1 represents the most *simple siphon*, being a bent tube, one of the branches or legs of which is longer than the other. To use this instrument, place the short branch into the vessel from which the liquor is to be transferred, and draw the air out of the other leg by the mouth, the liquid will rise in the shorter leg and pass over into the vessel placed for its reception below the end of the longer leg. The same effect may be produced by first filling the tube with a portion of the liquid to be decanted, then turning the syphon over, having stopped, with the fingers, the orifices of the two legs; immersing the shorter leg in the vessel, and taking off the finger, the liquid contained in the tube will pass into the vessel placed below the longer leg, and be replaced by the contents of the vessel. This method cannot, of course, apply when corrosive liquids are to be drawn.

Fig. 2.

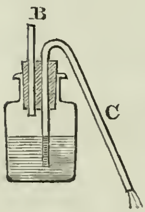


Fig. 2 represents a siphon which may be conveniently used in the transfer of many corrosive liquids. It is filled by pressure. To put it in operation a vessel must be employed which can be closed at the top by a cover or cork. Adjust a tube, B, to the cover or cork through which the siphon passes, and blow through the upper end of the tube; the pressure of the air on the surface of the liquid will force it up into the siphon C.

The siphon shown in fig. 3 may be conveniently used when the liquid is to be drawn at intervals. Let the tube ABCD, filled with water, or with the liquid to be drawn, be plunged into the reservoir, the end A having been previously stopped. If the siphon be then inclined so as to bring the mouth, D, below the level of the liquid within the reservoir, the liquid will run through the tube. By raising the end D above that level, the flow of the liquid will be stopped.

Fig. 3.

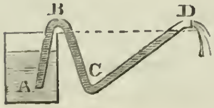


Fig. 4.

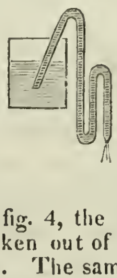
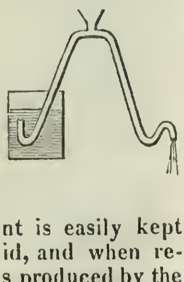


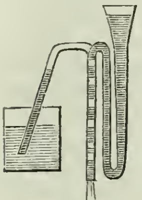
Fig. 5.



By bending the tube as in fig. 4, the instrument is easily kept from emptying itself, when taken out of the liquid, and when replaced it will continue to draw. The same effect is produced by the Wirtemburg siphon represented in fig. 5. By a funnel shaped re-

ceptacle placed on the top of this siphon it may be conveniently filled by pouring some of the liquid to be drawn, or water, when dilution is not material, into the funnel or top of the tube, and duly inclining the delivering branch of the instrument; the funnel is then stopped.

Fig. 6.



The siphon of M. Collardeau is shown in fig. 6. The funnel in this instrument is attached to a bent tube. The operation is begun by pouring some of the liquid to be drawn off into the funnel. The flow takes place by jerks until the air is carried off, when it becomes regular.

By the addition of a stop-cock to the extremity of the longer branch of this siphon, it can be made to draw and stop at pleasure.

Fig. 7.

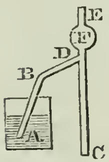


Fig. 7 represents a modification of the siphon which is filled by suction. Introduce the end, A, of the tube into the fluid to be drawn off, and stop the opening C, raising B higher than D; apply the mouth at E, and suck until the bulb F is filled, or nearly so; stop, quickly, the aperture E, and open the end C of the siphon, which will begin to draw. This is a very useful instrument for drawing off a corrosive liquid, or one in which there is any sediment.

Fig. 8.

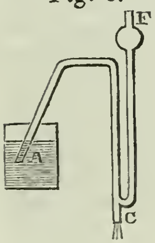
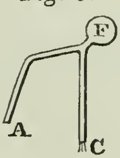


Fig. 8 is a safer instrument of the same sort with that just described. It is put in operation by immersing the aperture A in the liquid to be drawn off, stopping the extremity C, and producing a strong suction by applying the mouth at F; the liquid ascends and fills the siphon which begins to act as soon as the aperture C is no longer stopped. The point of junction of the two tubes must be held lower than the level of the liquid to be drawn off.

Fig. 9.



The siphon shown in fig. 9 is a very convenient instrument for drawing off a small quantity of a liquid. The liquid is raised into it by rarifying the air in the bulb F. To effect this, after dipping the end A into the liquor to be drawn, apply the flame of a candle to the ball F, then stop the aperture C, let the ball cool, holding it higher than any other part of the tube: as the air in the bulb contracts by cold, and the liquid ascends and passes the highest point of the bend, the finger is removed from C, the liquor will pass down the longer leg, and be discharged at C.

Observations on the Deviation of the Compass; with examples of its fatal influence in some melancholy and dreadful shipwrecks. By the Rev.* WILLIAM SCORESBY, *F. R. S., &c. Communicated by the Author.*

The deviation of the compass on shipboard, is that error, or anomaly in the needle, from the correct magnetic meridian, produced by the magnetic condition of the vessel. It is but a modern discovery, and, until within a very few years, did not obtain much consideration: and even now, is very far from having obtained that general attention to which its great importance in practical navigation so abundantly entitles it. A few personal observations, and well ascertained facts, will be sufficient to prove that a correct knowledge of the deviation must greatly contribute to the safety of persons traversing the ocean; and that ignorance of it must expose all persons engaged in commercial transactions by sea to a fearful risk, (a risk by no means generally appreciated or accredited,) of life and property.

The amount of deviation necessarily varies, because of the unequal character of the disturbing force, not only in different vessels, but in the same vessel in every change of magnetic dip, and on every change of course. In very high magnetic latitudes, the deviation may be such as to influence the compass more than the directive action of the earth; but in equatorial regions it will be generally so inconsiderable as to be of little importance in practical navigation. On two or more points of the compass, the deviating force being coincident in direction with the earth's magnetism, is not observable, (these are denominated "the points of change;") whilst its influence rises to a maximum in the ratio of the sines of the course (nearly) on both sides of the points of change. Most commonly the points of change will be found to occur when the direction of the ship's head is north or south, or nearly so; and the maximum on or near an east or west course. But to this rule there are many exceptions.

In an ordinary way, a vessel sailing *up* the English Channel, steering E. or E. by S., will probably have only 25° or 26° of westerly variation, instead of 27° or 28°; the difference of 2° or 3°, or about a quarter of a point, being the effect of the local attraction, which, in thick weather, or during the night, must produce a serious error in the reckoning. In going *down* the Channel, on the contrary, the actual variation of the compass on board the vessel will probably be 29° or 30°, instead of 27° or 28°, the variation on shore, which difference, if unknown to the captain or pilot, must throw the vessel considerably to the southward of her position. Even more than this quantity of error was fully proved by Mr. Bain, whose "Essay on the Deviation" contains a number of useful practical observations on

* From a "Lecture on the Deviation of the Compass," delivered at the Royal Institution at Liverpool, by Captain (now the Reverend) William Scoresby, F. R. S.; January 23, 1822.

the important subject on which it treats;* and a still larger quantity of error, amounting, when at a maximum, to six or seven degrees of deviation, or even more, has subsequently been discovered in very many of our ships of war under the magnetic dip and condition of our own coasts.

Bain also found, in navigating the river St. Lawrence, that it was necessary to steer a different course coming down from the opposite one he steered on going up. Owing to this circumstance (the local attraction,) one of our ships of war, the Zealous, had a very narrow escape in going up that river. During a fog, this vessel ran so near the shore, not far from Cape Chat, that she was in nineteen fathoms water; and had not the fog fortunately cleared at the moment, she would probably have been wrecked. Many of the losses that have occurred in the St. Lawrence are, he reasonably concludes, attributable to the local attraction.

In crossing the Atlantic to the W. or SW., vessels will almost always be found to the southward and eastward of their reckoning; and in an equal degree if passing to the north-eastward or eastward, the error being still towards the SE.

In the voyage to Greenland, I have invariably found the deviation acting with the most marked effects; so much so, indeed, for some years before I knew any thing about the cause, that I found it necessary to allow only two points westerly variation outward, instead of two and a half, and three homeward, in order that some sort of agreement might be found between the reckoning and the actual place of the ship. The total effect of the deviation on a passage from Spitsbergen to England commonly amounts to four or six degrees of longitude; and almost all strangers to that navigation, unprovided with chronometers, instead of making Shetland, the place at which the whalers aim, fall upon or near the coast of Norway, 160 or 180 miles distant. Even Captain Phipps, on his return from his Polar discovery, committed this error, but its cause was then unknown.

This error was usually attributed to the operation of an easterly current—but it undoubtedly belongs in a great degree, if not entirely, to the deviation.

The ship Baffin, which I recently commanded in the Greenland fishery, possessed a very large and uncommon measure of local attraction. The first intimation which we had of this dangerous influence, was on passing on a north-easterly course to the eastward of the Faroe Islands. In one day's run, during a gale of wind, the difference of latitude, as found by observation, was less by *almost a degree* than that determined by calculation,—an error which, if ascribed entirely to the local attraction on the course steered, would have indicated a quantity of deviation amounting to nearly two points! Though this amount, however, was subsequently found to be considerably in excess, yet the absolute quantity in a high latitude, where the dip of the needle was about 80°, proved to be 17° on a S. SW.

Mr. Barlow's admirable investigations on the Laws of the Magnetic Deviation were not in my hands when this lecture was delivered.

course! The dangerous influence of such a deviation will be readily appreciated by a simple example.

Suppose the Baffin to have sailed with a fair wind 100 leagues on a S. SW. course, per compass, (the variation being, say, 42° W.) and then back again 100 leagues on a N. NE. course, per compass, it is evident that, if there were no deviation, or other cause of error, she would return exactly to the point from whence she started. But, in consequence of the deviation only, her actual position would prove to be 123 miles to the eastward, and 55 miles to the northward of the place from whence she set out—the deviation, as above, being 17° southerly when steering S. SW., and $8\frac{1}{4}$° easterly, as also determined by observation, when steering N. NE.

Or, supposing the same ship to sail 200 leagues on a S. SW. course, (a course often pursued on the homeward passage from the Greenland sea,) the error in the reckoning, neglecting the deviation, would be 86.4 miles too far southerly, and 160.8 miles too far westerly! That is, the ship would prove to be 189 miles to the eastward and northward (or in the direction E. 27° N. true,) of her position, as calculated without the application of a correction for the deviation. Such an error, existing without its being known or compensated, it is evident, might be productive of the most fatal consequences.*

Hence, besides the many hairbreadth escapes to which navigators have been exposed from ignorance of the deviation, there can be no doubt but that some of the most dreadful shipwrecks which are to be found in our naval annals are to be ascribed to the same cause. I shall mention an instance or two where very fatal consequences have resulted from ignorance of, or inattention to, the deviation of the compass.

A fleet of sixty-nine sail of merchant ships, bound to the West Indies, sailed from Cork, under the convoy of his Majesty's ships, Carysfort and Apollo, on the 26th of March, 1804. On the 27th they were out of sight of land, with a fair wind, blowing strong, under which they steered W. SW. until the 31st. At noon of Sunday, 1st April, they observed in latitude 40° 51′ N., longitude, by account, 12° 29′ W. At 8 P. M. of the same day, the wind shifted to S. W., and began to blow very hard: course about S. SE. During the night the Apollo lost some of her canvass, and had to reduce sails to a fore-sail with main and mizen storm-stay-sails. At $3\frac{1}{2}$ A. M. of the next morning, when by their reckoning they were above 100 miles from any land, the Apollo, to the astonishment of every one on board, struck the ground. After beating over a shoal, she was again afloat for about five minutes; she then met the ground, and beat with such tremendous violence, that it was apprehended she would instantly go to pieces. Getting, however, at length, firmly wedged on shore, she became more quiet; but the sea broke continually over her. At daylight many other vessels were found to be on shore;

* See the Author's Voyage to the "Northern Whale Fishery," in 1822, p. 94, where this subject is enlarged upon, and from which these illustrative examples have been superadded.

and the sailors discovered that they were on the coast of Portugal, near Cape Mondego. It is unnecessary for me to detail the sad events which succeeded, excepting the general results of this dreadful accident. The Apollo being at a distance from the beach, and the gale continuing for three or four days, lost sixty of her crew, who perished from cold, drowning, hunger, and other circumstances, connected with their perilous situation. Many adhered to the wreck for about sixty hours, sustaining, during this period, the most intense anxiety and suffering from cold, wet, and exhaustion, without either meat or drink. Along with the Apollo, twenty-nine sail of merchantmen were likewise wrecked; some of these foundered with all hands, and most of the others lost from ten to twelve men each. The total loss of lives has been estimated at 250 to 300 men.

This fatal accident has very generally been ascribed to the carelessness and inattention of the Commodore; but, from what has been observed, it will, I think, appear most probable that the deviation of the compass was the occasion of the calamity. An officer, from whose narrative the preceding facts were derived, acknowledges that no one on board the Apollo expected the ship to be near land, and that when the ship struck, they imagined they were upon some unknown shoal. It is indeed possible that part of the error might have been owing to currents; but as we know that the deviation in men-of-war, on a course S. 29° W., and a distance of 700 miles, (the course and distance between Cork and Cape Mondego,) would, in many cases, be upwards of a degree of longitude, we may reasonably consider the deviation as a material cause in this disaster. The Commodore was no doubt chargeable with a want of that prudent and watchful jealousy of mere dead reckoning, which, under Providence, is one of the best safeguards in practical navigation.

[TO BE CONTINUED.]

¶ *Walker's Corrugated Iron Roofs and Gates.**

A new description of iron sheeting for roofs and doors has been recently invented by a Mr. Walker, (of Rotherhithe, we believe,) which, we think, bids fair in no long time to supersede every other. It is called *corrugated* iron, which, in plainer English, means *furrowed* or *fluted*, and derives its very valuable properties simply from being passed through fluted rollers when in a red hot state. Mr. Loudon has given in a recent number of his excellent Encyclopædia of Cottage, Farm, and Villa Architecture, so complete and satisfactory a description of this improved article, that we gladly avail ourselves of his kind permission to transfer it to our pages.

"Corrugated iron roofs are composed of sheet iron, impressed so as to present a surface of semicircular ridges with intervening furrows, lengthways of the sheet. By this means the sheet, from a plain

* Articles selected by the Committee on Publications are designated by this mark, ¶

flat surface, having no strength but from its tenacity, becomes a series of continued arches, abutting against each other; and the metal, by this new 'position,' acquires strength also from its hardness. To give an idea of the strength acquired, it is observed by Walker, the inventor of this mode of preparing sheet iron, that 'a single sheet of iron, so thin that it will not continue in a perpendicular position, will, after undergoing the process of corrugation, bear upwards of 700 lbs. weight without bending in the least degree. Iron so furrowed will be preferable to common sheet iron for covering a flat roof; because the furrows will collect the water and convey it more rapidly, to the eaves. But this is a trifling advantage, scarcely worth mentioning, in comparison with others which follow:—Suppose that in addition to furrowing a sheet lengthways, it is also bent in one general curve in the direction of its length, we have then an arch of great strength, capable of serving as a roof, without rafters, or any other description of support, except at the eaves, or abutments. It is evident that, the span of any roof being given, segments of corrugated iron may be rivetted together so as to form such an arch as may be deemed proper for covering it. To every practical man it will be further evident, that a roof of extraordinary span, say one hundred feet, which could not be covered by one arch of corrugated iron without the aid of rafters, might be covered by two or three, all resting on, and tied together by, tie-rods. Further, that in the case of roofs of a still larger span, say two hundred feet, a tie-rod might be combined with a trussed iron beam, by which roofs of this span, or even of more than double the extent, might be covered without a single rafter appearing inside. In short, no material hitherto brought into notice at all approaches this in its capacities for forming light and economical roofs of the greatest extent of span, and with the least loss of interior room. Its durability will depend on the application of oil or tar paints; for barns, sheep houses, and various other country buildings, and for all manner of sheds, both in town and country, it is particularly suitable. As the invention has only been known four or five years, much has not hitherto been done with it; but there are several roofs of corrugated iron in the London docks. One of these is 225 feet in length, its width is forty feet, and the height of the columns on which the roof is supported is twelve feet. The columns are of cast iron, a gutter of which metal is continued from column to column, the whole length of the roof; and in the gutter rests the edge of the roof. The arch is formed of several sheets of iron, curved in a reverse direction to the corrugated arches, and riveted together longitudinally. Similar arches connected to each other by rivets, compose the roof; every corrugated arch forms a water course, ending in the gutters at the sides, and thereby rendering it quite water-proof. To give stability to the whole, a tie-rod is carried across the shed from each column to the one opposite. Between this shed and the brick wall is a lean-to corrugated roof, forming a half arch, springing from the gutter and resting against the wall. The walls of buildings may be constructed of this iron set on edge, either in single plates, or of double plates, with a vacuity between to lessen the effect of changes in the exterior

temperature on the space enclosed. As the corrugation or fluting of the iron may be made either large or small, it may be adapted to the panels of doors; or an entire door, with a frame of rod iron, may be fitted in so as to serve as a substitute for a ledged door. The sliding gate has been erected as an entrance to one of the docks. The frame is of the usual construction of timber, and inserted in a brick wall. The gate is composed of sheets of corrugated iron, riveted together so as to form one large panel, the size of the opening; the foot of this gate rests in a groove, made of timber, or stone, and imbedded in the earth so as to be level with the roadway. On the upper edge are two grooved wheels, which work on an iron ledge groove. Shutters to shops may be made of this description of sheet iron, as well as chests, and a variety of other objects that will easily occur to a practical man. The following are the prices at London in 1832:—Roofs, per square of 100 feet, £5 10s.; verandas per square, £7; and doors of the ordinary size in six panels, £2 10s. each. This description of roof is not particularly applicable for small sized cottages, but may be used for large ones; and for smithies, carpenters' shops, and all manner of sheds, it seems particularly appropriate. Portable houses might be very readily made of it for exportation; but wherever such houses may be erected, they must be covered with ivy, or some other evergreen creeper, to moderate the effect of changes in the exterior temperature.

[*Mech. Mag.*

¶ *Undulating Rail-way.*

This contrivance, which we have already cursorily noticed, has occasioned some discussion among scientific and practical men; but it does not appear that any explanation of its effects has been suggested. Indeed, we are inclined to think, that the patentees themselves are not fully aware of the physical principle on which the advantage which they have undoubtedly gained, depends.

The problem is one, the full illustration and development of which would require the language and symbols of mathematical physics; some notion of it may, however be conveyed in such a manner as to be intelligible to the general reader. We shall first state what it is that the undulating rail-way performs, in which the level rail-way fails; and we shall next explain the physical law on which this depends.

Hitherto, it has been received as a practical axiom, that rail-ways can only be advantageously applied between points where a uniform dead level can be obtained. Now the patentees of the undulating rail-way maintain a proposition which is the logical contradictory of this. They hold, that even if the projected line be naturally a dead level, it must be artificially cut into ups and downs, so as to keep the load constantly ascending and descending until the journey is completed; and in so doing, they assert that the transport is produced in a considerably less time with the same moving power, or in the same time with a much less expenditure of the moving principle. Again,

it has been held as a practical axiom, that if on a rail-way it becomes necessary to ascend from one level to another, the ascent is most advantageously made by a plane uniformly inclined from the lower to the higher level. On the contrary, the patentees of the undulating rail-way hold that the ascent is effected with a lesser power, by dividing the interval into ups and downs, so as to cause the carriage alternately to descend and ascend until it arrive at the upper level. Indeed, one of these propositions follows from the other, for if a greater momentum is generated in going from one point to another of the *same level*, by undulation in the rail-way, that *excess of momentum* will carry the load to a *greater height* than the momentum which the *same power* would generate on a *level rail-way*.

These facts have been illustrated by a small model on a wooden rail-way in the Adelaide street exhibition room. We have ourselves at that place instituted the following experiments, with the results here detailed. The moving power was a spiral main-spring regulated by a fusee: a load was placed on a level rail-way of such an amount that the moving power was barely able to overcome the friction, but incapable of moving the load. In this state the carriage and load were transferred to the undulating rail-way, and the same moving power impelled the load with ease and with considerable velocity from one end to the other; and lest any difference of level should exist between the extremities, we caused the same experiment to be made in the contrary direction, which was attended with precisely the same result. Hence it was evident that, at least with the model, a power incapable of transferring the load between two points at a given distance on a level rail-way, transferred the same load with facility and despatch through the same distance on the undulating rail-way.

Our second experiment was as follows:—We loaded the carriage in the same manner on the level rail-way, so that the power was barely equal to the friction, but incapable of moving the load. We then transferred the power and load to a rail-way, the remote extremity of which rose above the nearer extremity at the rate of one inch in eight feet. The power which was thus utterly incapable of moving the load on the level, easily transferred the same load from end to end of the undulating rail-way, and at the same time actually raised it through one perpendicular inch for every ninety-six inches of its progress along the horizontal line.

Among the scientific men who have witnessed this exhibition, many, it is said, have declared, what indeed appears at first to be the case, that the result is contrary to the established principles of mechanics. We do not perceive, however, any difficulty in the phenomenon.

The effective impelling power when a load is tracked upon a rail-way, must be estimated by the excess of the actual impelling power above the friction. Now, it is well known that the friction, being proportional to the pressure, is *less on an inclined than on an horizontal rail-way*. The same impelling power which on the level rail-way is *only equal to the friction*, and therefore incapable of accelerating

the load, becomes effective on the inclined rail-way, where *it is greater than the friction.* The excess therefore becomes a means of generating velocity, so that when the load arrives at the extremity of the undulating line, a quantity of velocity has been communicated to it, which is proportional to the excess of the friction on the undulating above the friction on the level line. This is, theoretically speaking, a decided and undeniable advantage which the inclined rail-way possesses over the level. We could make this point still more clear, if we were addressing mathematical readers.

Now, if it be admitted that at the extremity of the undulating line, a velocity is generated in the moving body much greater than any which could be produced by the same power acting on the level line, it will follow, demonstratively, that this velocity will be sufficient to carry the load up a certain height, bearing a fixed proportion to the velocity itself; and hence it will be perceived that a moving power, which is incapable of moving the load on a dead level, will be capable, not only of moving it between the extremities of an undulating line when at the same level, but even of raising it to a higher level.

But the practical application of this principle seems to promise still greater advantages. In the above reasoning, we have assumed that the impelling power acts with a uniform energy in accelerating the motion of the load. This, however, is not the case when steam power is applied: the load soon attains a maximum velocity, and the engine becomes incapable of supplying steam fast enough to produce effective pressure on the piston. The cylinder, in this case receives steam from the boiler only at the same rate as it is discharged by the motion of the piston, and scarcely any direct effect is produced by its pressure on the piston. In the undulating rail-way, the working of the engine will be suspended during each descent, and a part of the succeeding ascent. In this interval the steam will be *nursed* and accumulated so as to be applied with its utmost possible energy the moment the velocity on the brow of the hill begins to decline. When the load surmounts the summit and begins to descend the next hill, the operation of the engine will be again suspended, and its powers reserved and accumulated for the next ascent. The duty of the engine will thus be, not to produce steam constantly at a great rate, but to produce steam of excessive energy for short and distant periods. Every one who knows the practical working of high pressure engines will see the advantage likely to result from this circumstance.

When the line connecting two points at the same level is thus resolved into curves, the motion of the engine may not inaptly be compared to that of a *pendulum*, and the moving principle stands in the place of the *maintaining power*, the functions of which are the same precisely as those which it discharges.

On the other hand, it is right to consider the practical objections to this projected improvement. The very small amount of friction on iron rail-ways renders the rate of motion when descending an incline frightfully great. We have ourselves descended the Sutton plane on the Manchester rail-way, followed by above one hundred tons of goods, and, although not particularly timid, we cannot deny that we

felt considerable apprehensions, when on applying the drag to moderate the fury of our speed, it was instantly burned to a cinder. The power of gravity in descending a plane of this kind, which only falls one foot in ninety-six, is perfectly uncontrollable; and if great descents be attempted, we very much fear that the velocity will hardly be consistent with safety.* It must not be forgotten that the more rapid the descent the less will be the friction, and therefore the greater the velocity due to a given number of perpendicular inches. It would be premature, however, at present to pass judgment on what, after all, can only be satisfactorily decided by experiment. Meanwhile, we have no hesitation in stating, what every scientific man, after reading what we have above said, will confirm, that in the project there is nothing erroneous in principle, as many have supposed. On the contrary, whatever be the impelling power, it will undoubtedly be rendered more effective by the undulation of the line; and if steam be the power, it will be rendered doubly effective, by the advantage gained by being enabled to suspend the action of the moving principle from time to time, so as to collect its energies.

We are glad to learn that the patentees have obtained the means of constructing an undulating line of rail-way of some miles in extent, for the purpose of testing on the large scale, what they have already proved by a model.

Their success will mainly depend on the judicious adaptation and selection of the curves into which the line will be divided. It may be worth while to consider, whether the common *cycloid* may not be rendered, by its well known properties, one of the best which could be selected. It will likewise require consideration, what succession of curves will give a *maximum* advantage, when the extremities of the line are at different levels, and to provide not only for the efficient ascent from the lower to the higher level, but likewise for the safety of the descent in the contrary direction.

Although, upon the whole, we have a strong persuasion of the ultimate advantages of this project, yet we can see many practical difficulties which will stand in the way of the patentees, and which will require not only expense, but no little ingenuity, to overcome.

[*Athenæum.*

¶ *The Undulating Rail-way.*

I have been casually informed that there is exhibiting somewhere about town a model of an undulating rail-way, whereby the inventor undertakes to convince the public that the antique notion of level surfaces being the best adapted for wheel carriages is entirely wrong; and, of course, if his position be correct, the road surveyors have

* Since the above was set up in type, we learn that a fatal accident has occurred on the spot here alluded to, arising from the engine and train being carried off the rails.

wasted a "pretty considerable" quantity of money to make roads worse than they were before, by levelling the hills, which ought to be restored without delay. But the inventor of the undulating rail-way is by no means an originator. The Russian ice hills on the Neva, for the amusement of the sleighers in the winter season, formed of boarded scaffolds, overlaid with blocks of ice, are much more ancient; and the *Montagnes Russes* of the *Champs Elysèes*, which served for summer amusement to the youths and maidens of Paris, the king of Prussia inclusive, some fifteen years back, were rail-roads of something the same nature as that now proposed. But the proposer of the present undulating rail-way has stumbled upon a fallacy, which possibly may deceive himself, but which ought not to be suffered to deceive the "barren spectators" amongst the public, because all such fallacies serve to inflict mischief upon the really useful inventors, by getting them classed under the invidious name of "schemers," which ought properly to be confined to the plotters of absurdities alone.

There can be no doubt that a carriage placed on the top of a hill of sufficient inclination will descend with so much momentum as to drive it partly up a second hill of the same height and inclination, or over a hill of considerably less height and inclination. There can be no doubt also, that a fly wheel, put in motion, will continue to revolve for some time after the original moving power ceases to act on it; but it is a woful error to suppose that either the fly wheel or the carriage can generate additional power of their own. I once heard a story of an Irish schemer who had devised a plan for increasing the power of a ten horse engine to that of a fifty, by means of an enormous fly wheel. Finding a "flat," he was set to work; and when he had, after some difficulty, succeeded in casting his enormous wheel, he expended much money in fitting up an apparatus to turn and polish it all over, to prevent the loss of power by friction in the atmosphere with a rough surface! Much time being lost, the proprietor, who was at all the expense, became impatient, and then there was another delay to know how the wheel was to be stopped with all its giant power. This having been arranged, both schemer and proprietor were much astonished to find that it would not go at all. The proposition to get additional power, or save power, by means of an undulating surface, savours much of a perpetual motion scheme. It is clear that what is called momentum in falling bodies, can be nothing more than gravitation, whereby all bodies have a tendency to get as near as they can to the centre of the earth, and the heaviest have the most success. The momentum of the carriage in going down the hill is in proportion to the height which it is raised, and the diminution of friction by the degree of inclination. In the Russian ice hills, the first, from which the sleigh starts, is of a given height; the second diminishes; the third also, and so on till the level ice is attained. Were all the hills of the same height, the sleigh would descend the first, partly ascend the second, and then oscillate for a time between both, until it stopped. The reason that the sleigh moves at all, that it possesses the power of motion, is, that it is removed from a lower to a higher level, and the tendency of its gravitating power is to reach the

lowest, as is the case with water, which has the advantage of being a more mobile substance. But what places the sleigh in the situation to use this power? or, rather, what confers the power upon it? The animal power, either of human hands or horses' shoulders, which has been communicated to it, and which, doubtless, if means were taken to ascertain it, would be found to be exactly equivalent to the power put forth in surmounting the hills, with the exception of the loss by friction, i. e. the animal power applied in the first instance would have served to draw the sleigh on level ground as great a distance, I mean over as many yards of surface, as it traversed on the hills. Therefore, in this case, there would be no gain of power, or of any thing but amusement.

The late Mr. Bentham was accustomed to say, in a jocular manner, that when he made a world it should be all down hill. Now, such a contrivance would be admirable for diminishing friction, if there were any arrangement whereby we might always be at the top. If the new invented rail-way were contrived so that it might be constantly down hill, or over diminishing hills, there is no doubt that much friction might be avoided; but by what process are we to get to the top to begin again? There is but one answer. By labour—got out of animals or steam. And what would be the increase of work up hill? What was gained one way would be lost the other. I say nothing of the mischief resulting both to cattle and engines by the irregular motion. But we will suppose the rail-way an average level, i. e. the undulations to be all alike, what possible advantages can it have over a straight and level surface? It has been shown that to get the momentum of the high level, the power must be, so to speak, "put into it," i. e. it must be applied beforehand, just as the steam of an engine is got "up" to start with effect, or as is said of a horse who has been off work a few days, "his go is bottled up." When the carriage on the undulating rail-way has reached as far up the second ascent as the momentum will drive it, how much power must be put on to carry it up the remainder of the ascent? Probably as much as it would have taken to perform the distance of two undulations on a level road. The *Montagnes Russes* of Paris were formed in a circle, and consisted of one descent and one ascent. The descent was steeper than the ascent, yet the impetus or momentum only served to carry the car one-third up the ascent, when it was hooked by an endless band, worked by horse power below, and drawn to the top. Now the power applied by the horses in drawing that car to the top, was probably equivalent to the power which would have been exerted in drawing the car the whole distance on level ground, difference of friction excepted. The fact is that in all cases the same quantity of power must be consumed to drag a wheel carriage up to a given height. If the ascent be steep, a large amount of power is requisite for a short time. If the ascent be gradual, a small amount of power will be requisite for a longer time. The total will be equal. Increase of speed is loss of power, and vice versa; yet, strange to say, there are numerous unthinking people who believe that, by making a simple machine complicated, as in the case of this rail-road, they ac-

tually multiply their power; as if an accelerated motion down hill were not balanced by an up hill to ascend in turn.

The process is somewhat similar to that of a man who, determining to erect a water-mill, were first to erect a wind mill or steam engine to pump up the water to the height necessary for his water wheel. There are, I believe, water mills in some of the mining districts which are supplied from the pumps worked by engines, but then the power of the engines is not expended for the purpose of getting a stream of water, but for the purpose of getting rid of a stream of water. The power got out of the water afterwards, was first put into it by the engines, and the saving that power by using it for the water mill is analogous to the process of the soap makers, who boil down their waste ley to recover the alkali it may contain; but they do not make waste ley for the purpose of getting the alkali out of it. The power of the water mill is commonly but a very small proportion of that of the engines which supply it, because the descent of the fluid is much less than its ascent. Were it to fall on the wheel from a height equal to that from which it was pumped up, the power of the engine and the power of the water wheel would be nearly equal, the friction of the pump being taken into account.

Whatever the proprietor of the undulating rail-way may think, "power" cannot be self-generated. A man who is in a valley cannot get up into a mountain without labour of some kind; and whether the ascent to the mountain be a straight inclined plane, or a number of undulations, will matter very little; but what difference of labour there is, will be in favour of the former. When the boy makes his marble bound on the stone pavement, there is no saving of labour to him, because it happens to bound three times with one exertion of his muscles. He is obliged to exert so much the more power. The proposition to gain power by making a carriage go up hill and down hill instead of on a level, reminds me of a scheme I once saw of a self-moving carriage, which was to go on as soon as it was loaded; and the greater the load the faster it was to travel. The ingenious inventor had heard talk of a wheel within a wheel, and he literally put it in practice, small wheels being contrived to run on a rail within the periphery of large ones, both before and behind a four wheeled vehicle, and so fixed, by means of guides, that the weight was pressing on the rim of the large wheels, at a considerable height above the ground, in the expectation of making them revolve. The inventor had entirely forgotten that while the large wheel was pressed down hill, the small one had to travel up hill, and consequently that it was "no go." Perfectly similar is the undulating rail-way. If the eight wheeled vehicle could have moved at all it might have been running even unto this day; and if up hill and down hill *versus* level were a clear gain, it might be improved on till animal and machine power might be dispensed with, and the rail-way locomotive power of every man might reside in his own fingers. We have not come to that yet. We may exert a great quantity of power in various ways it is true, but no more power can come out of a thing than that we put into it. If we wind up a jack, or a clock, or a watch, the amount of power

which we have rapidly given is slowly expended—that is the whole process; but a man would be laughed at who were to assert, that the power we had given to the machines increased in quantity while in their progression; and thus should the man be laughed at who asserts that the power of a horse or machine is multiplied by going up and down hill.

Since writing the above, I have caused inquiries to be made at the place of exhibition, and am informed that the inventor has gone to Birmingham (I think) for the purpose of setting his scheme going on an undulating rail-way of three miles in length, to try it on a large scale. So much capital lost to John Bull and his heirs for ever, if the report be correct.

[*Mech. Mag.*

¶ *Comparison of Wire with Bar Iron as a material for the Supporting Chains of Suspension Bridges.*

Some of the French engineers appear to prefer wire to bar iron for suspension bridges. The reasons they give are that iron wire is stronger than bar iron; that cables of wire can be put together more easily and rapidly than chains; that it is more easy to ascertain whether it be sound or not; and, lastly, that it is an easier operation to get wire cables up into their places than bar chains.

The facility of working wire without heavy machinery, and almost without any but the most common tools, may render its use expedient under certain circumstances, viz. for a small bridge, and where the engineer is deprived of mechanical aid; but it has many disadvantages, which would become glaring if it were applied in the construction of a large and strong bridge.

First, although a single wire is stronger *per square inch*, than a bar of iron, it is much to be doubted whether a *cable* made of wires is stronger than a bar chain of equivalent dimensions, because of the inequality of tension in the several wires, which throws a greater share of strain on some than on others, and, therefore, reduces the effective strength of a cable to that of a cable of less diameter. This inequality it is hardly possible to prevent, even if the wires are drawn, in making up the cables, to the same curvature that they are intended to have when in their places.

Secondly, wires exposing a surface greater than bars of equal section, are more quickly destroyed by oxidation. A coating of varnish, it is true, may somewhat preserve them, but bars may also be preserved by varnish and painting, and are still, on that point, superior to wire cables.

Thirdly, wires are very apt to have kinks and bends in them, which cannot be got out without a very considerable strain;* and, when that

* Mons. Vicât states, in speaking of No. 18 wire, the ultimate strength of which was 1165 lbs., that it required sometimes from 116 to 350 lbs. to take out the bends.

has been done, it is difficult to ascertain whether the wire has not been prematurely injured at that part. The long bends also that are formed frequently in wire can hardly be got rid of at all. The author has repeatedly strained wire something less than one-tenth inch diameter, (the ultimate strength of which would be 600 lbs.) to a tension of one-seventeenth of the chord line, and then loaded it in the middle with 130 lbs., and caused that weight to be jerked upon the wire, so as to produce a strain upon it very little short of its breaking strain, without being able to remove the bends that had formed in it. Wire will, in fact, often break before losing its bends; and yet, if they are allowed to remain, be it ever so little, they, of course, impair the equality of strain upon the several wires that form the cable.

Lastly, although a small cable is very easily got up into its place, it is so, not because it is a cable, but because it is comparatively small and light. But a cable of large dimensions, say three inches diameter, or more, would be, by no means, more easily managed in raising it than a bar chain of equal section. The latter would, on the contrary, be the more flexible of the two.

The ductility and manageableness of wire in working it into cables, and in handling the cables when made, have been also much exaggerated. Mons. Vicât, who, in building the bridge of Argentât, had some experience in the use of wires, allows this, notwithstanding his final preference of wire. He says, "I had accustomed myself so completely to look upon the flexibility of wire cables as like that of hempen cables (that is, for moderate bends,) and all I had read on the subject, gave me so great a feeling of security, that I had never even given a thought to the effect that would be produced on the equal tension of the wire, by the new curves that the cables would assume when raised into their places. This effect is, however, immense."

Elsewhere, he says, after stating the defects of wire:

"It may be taken as a standard, that a cable properly bound round, must be considered as having the rigidity of a bar of iron. Consequently, such a cable cannot be rolled up, nor bent backwards and forwards. And, moreover, if it is beyond a certain length, and that not a very great one, it is hardly practicable either to move it about, or to raise it up into its place."*

In fact, if wire must be used, it would be better to form it into links of from ten to fifteen feet long, and couple them with short links, either of wire or iron, and bolts of large diameter, made hollow for lightness in the way described p. 117 for the Geneva bridge.

All things, however, considered, it may be safely pronounced, that bar chains are better adapted than wires for any thing beyond the size of a foot bridge.—*Drewry on Suspension Bridges.*

[*Rep. Pat. Inv.*

* Description du Pont Suspendu à Argentât, par L. T. Vicât, &c. p. 18.

¶ *Remarks on Suspension Bridges.*

The application of suspension bridges has, within a few years, increased so rapidly, and is still so much on the increase, that it may not be out of place to bestow a few lines on the consideration of when they are, and when they are not, expedient.

The prominent quality of a suspension bridge is its independence of the bed of the river that it crosses. Hence it can be thrown across an opening where it is impracticable, either from rapid current, or from the altitude of the banks, to erect centering for a stone bridge.

Its next most valuable qualities are the facility and expedition with which it can be built, the small amount of materials required, and the consequent economy.

These advantages, added to the elegant lightness of suspension bridges, have combined to throw a degree of charm about them, which is, perhaps, becoming exaggerated, and may lead to their adoption in unfitting situations.

It should be remembered that while suspension bridges are built on the proportions hitherto adopted, even in the strongest, they are incomparably slighter than stone, or cast iron arch bridges. There is no suspension bridge in existence that would be fit to bear permanently the load that is daily and hourly crowded on London bridge.

A bridge, destined to be a great and perpetual thoroughfare, exposed, not only to be frequently quite filled with people, and to the passage of troops, but also to the rapid motion of great numbers of heavy vehicles; in fine, a bridge in a busy part of a great city, ought not to be on the suspension principle.

For if it were made no stronger than our strongest suspension bridges, it would not possess sufficient stability. If, on the other hand, the strength were increased to a sufficient extent to enable it to bear safely its constant work, the weight, the difficulty of getting up the chains, and the increase in the masonry part, would so raise the expense, that it is doubtful how far it could be brought under that of a stone or cast iron bridge.

Add to which, a suspension bridge would never equal in stability a common arch bridge, because it is subject to vibrations, the law of which is not sufficiently known to calculate their precise results in practice, but which certainly are more dangerous in a heavy bridge than a light one. The object, therefore, in building a suspension bridge is, either to make it so light that its own vibration shall not hurt it; or if, as in nine cases out of ten, that cannot be done, then to make it so heavy and stiff, in proportion to the load it will have to carry, that the load shall not cause it to vibrate much. This, for a bridge liable to be constantly loaded with as much as it could contain, would be impracticable.

For large openings, where it is of importance to have a permanent passage, and yet where the number of passengers is seldom great at a time, suspension bridges are admirably fitted, because they can be

carried to almost any span, and any height, for a comparatively moderate expense.

There are also multitudes of situations where it has been usual to build arch bridges of stone at great expense, and where the traffic is not at all beyond the measure of strength that may judiciously be given to a suspension bridge.

For military bridges they are well fitted; the chains or cables, the platform, and even timbers ready prepared to frame suspension piers. An entire suspension bridge, in fact, might be carried more conveniently than a pontoon bridge, and could be rigged up for use in very little time.

They would be also peculiarly well adapted for crossing chasms in mountainous countries. On the Simplon and St. Gothard roads, for instance, the celebrated passes from Switzerland to Italy, the chasms that have to be crossed by bridges are frequently many hundred feet in depth, although not broad, and the faces of the rock so perpendicular, or overhanging, as to give hardly any means of erecting centering for an arch bridge. The expense, consequently, of making them must have been very great. A suspension bridge, moreover, on a great military pass, would give the inhabitants greater command over it; for by knocking out a few connecting bolts, a whole bridge might be dismantled very rapidly, without being destroyed, to check or retard the enemy's passage; whereas, to cut off the passage of a stone bridge, it must be blown up, and cannot be renewed but with great expense and loss of time.

For piers or jetties on the sea coast they appear to be peculiarly adapted from the openness of their construction. If the suspension towers are founded on piles, and themselves made of strong but open framework, and if the chains and platform are properly combined to get as much stiffness with as little weight as possible, so that they may resist vibration, without being so heavy as to be endangered by the vibration they cannot resist, a suspension pier may be buried in the waves without being hurt.

As to the durability of suspension bridges nothing but time can determine it. The chains are tried with nine tons per square inch, and do not stretch with that strain, according to which they are proportioned. But it does not follow that the iron may not receive injury from a permanent load of nine tons per square inch, although it receives no injury from it during the short time it is under proof. It would be a useful experiment to strain bars of iron with different loads, from seven tons per square inch upwards, and to leave them under their loads for several years, exposed to the air and damp; in fact, under the same circumstances as in a bridge. Again, as to preserving the chains from rust by varnishing and painting, they are certainly protected by it in some degree; nevertheless, destruction does go on, as is evident by the necessity of scraping and repainting every few years; and to what extent that silent corrosion may eat into the fibre and injure the tenacity of the iron without such injury being discernible to the eye, is not determined.

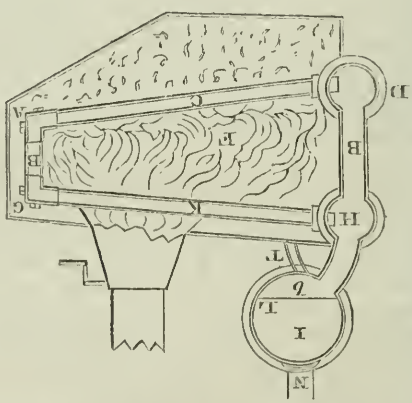
It might, perhaps, be well, while these points remain unsettled by

experimental knowledge, to give to suspension bridges more strength than is usual, or else to take out a bar or a bolt every few years and prove it over again, to ascertain when the bridge ought to be repaired. For it does not at all follow, that a chain bridge that will bear 1000 tons now, will bear 1000 tons a century hence." [*Ibid.*

Gurney's Steam Boiler.

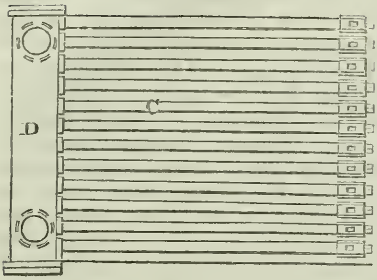
The boiler of Mr. Gurney differs in the most striking manner from all other forms of boilers hitherto invented. There is no part of it, not even excepting the grate bars, in which metal exposed to the action of the fire is out of contact with water. If it be considered how rapidly the action of an intense furnace destroys metal when water is not present to prevent the heat from accumulating, the advantage of this circumstance will be appreciated. I have seen the bars of a new grate, never before used, melted in a single trip between Liverpool and Manchester; and the inventor of another form of locomotive engine has admitted to me that his grate bars, though of a considerable thickness, would not last more than a week. In the boiler of Mr. Gurney, the grate bars themselves are tubes filled with water, and form, in fact, a part of the boiler itself. This boiler consists of three strong metal cylinders placed in a horizontal position one above the other. A section of the boiler, made by a perpendicular or vertical plane, is represented in fig. 1. The ends of the three cylinders just

Fig. 1



mentioned are represented at D, H, and I. In the side of the lowest cylinder, D, are inserted a row of tubes, a ground plan of which is represented in fig. 2. These tubes proceeding from the side of the lowest cylinder, D, are inclined slightly upwards, for a reason which

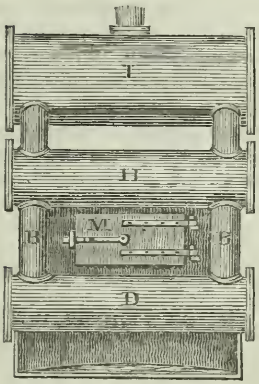
Fig. 2.



I shall presently explain. From the nature of the section, only one of these tubes is visible in fig. 1, at C. The other extremities of these tubes at A, are connected with the same number of upright tubes, one of which is expressed at E. The upper extremities G of these upright tubes are connected with another set of tubes K, equal in number, proceeding from G, inclining slightly upwards, and terminating in the second cylinder, H.

An end view of the boilers is exhibited in fig. 3, where the three cylinders are expressed by the same letters. Between the cylinders D and H there are two tubes of communication, B, and two similar tubes, between the cylinders H and I. From the nature of the section these appear only as a single tube in fig. 1. From the top of the cylinder, I, proceeds a tube N, by which steam is conducted to the engine.

Fig. 3.



It will be perceived that the space F is enclosed on every side by a grating of tubes, which have free communication with the cylinders D and H, which cylinders have also a free communication with each other by the tubes B. It follows, therefore, that if water be supplied to the cylinder I, it will descend through the tubes, and first filling the cylinder D and the tubes C, will gradually rise in the tubes B and E, will next fill the tubes K and the cylinder H. The grating of water pipes, C E K forms the furnace, the pipes C being the fire bars, and the pipes E and K being the back and roof of the stove. The fire door, for the supply of fuel appears at M, fig. 3. The flue issuing between the tubes F, is conducted over the tubes K, and the flame and hot air is carried off through a chimney. That portion of the heat of the burning fuel, which in other furnaces destroys the bars of the grate, is here expended in heating the water contained in the tubes C. The radient heat of the fire acts upon the tubes K, forming the roof of the furnace, on the tubes E at the back of it, and partially on the cylinders D and H and the tubes B. The draft of hot air and flame passing into the flue at A, acts upon the posterior surfaces of the tubes E, and the upper sides of the tubes K, and finally passes into the chimney.

As the water in the tubes C E K is heated, it becomes specifically lighter than water of a less temperature, and consequently acquires a tendency to ascend. It passes, therefore, rapidly into H. Meanwhile the colder portions descend and the inclined positions of the tubes C and K give play to this tendency of the heated water, so that a prodigiously rapid circulation is produced, when the fire begins to act upon the tubes. When the water acquires such a temperature that steam is rapidly produced, steam bubbles are constantly formed in the tubes surrounding the fire, and if these remain stationary in the tubes the action of the fire would not only decompose the steam but render the tubes red hot, the water not passing through them to carry off the heat. But the inclined position of the tubes, already noticed, effectually prevents this injurious consequence. A steam bubble which is formed either in the tubes C or K, having a tendency to ascend proportional to its lightness as compared with water, necessarily rushes upwards, if in C towards A, and if in K towards H. But this motion of the steam is also aided by the rapid circulation of the water which is continually maintained in the tubes, as already explained, otherwise it might be possible, notwithstanding the levity of steam compared with water, that a bubble might remain in a narrow tube without rising. I notice this more particularly, because the burning of the tubes is a defect which has been erroneously, in my opinion, attributed to this boiler. To bring the matter to the test of experiment, I have connected two cylinders, such as D and H, by a system of glass tubes, such as represented at C E K. The rapid and constant circulation of the water was then made evident: bubbles of steam were formed in the tubes, it is true, but they passed with inconceivable rapidity into the upper cylinder, and rose to the surface, so that the glass tubes never acquired a higher temperature than that of the water which passed through them.

This I conceive to be the cardinal excellence of Mr. Gurney's boiler. It is impossible that any part of the metal of which it is formed can receive a greater temperature than that of the water which it contains, and that temperature, as is obvious, can be regulated with the most perfect certainty and precision. I have seen the tubes of this boiler, while exposed to the action of the furnace, after that action has continued for a long period of time, and I have never observed the soot which covers them to redden, as it would do if the tube attained a certain temperature.

Every part of this boiler being cylindrical, it has the form which, mechanically considered, is most favourable to strength, and which, within given dimensions, contains the greatest quantity of water. It is also free from the defects arising from unequal expansion, which are found to be most injurious in tubular boilers. The tubes C and K can freely expand in the direction of their length, without being loosened at their joints, and without straining any part of the apparatus; the tubes E being short, are subject to a very slight degree of expansion, and it is obvious that the long tubes, with which they are connected, will yield to this without suffering a strain, and without

causing any part of the apparatus to be loosened. This is an advantage which will be rendered more apparent by referring to the defect already pointed out in the boilers used on the Liverpool and Manchester rail-way.

When water is converted into steam, any foreign matter which may be combined with it is disengaged, and is deposited on the bottom of the vessel in which the water is evaporated. All boilers, therefore, require occasional cleansing, to prevent the crust thus formed from accumulating; and this operation, for obvious reasons, is attended with peculiar difficulty in tubular boilers. In the case before us, the crust of deposited matter would gather and thicken in the tubes C and K, and if not removed, would at length choak them. But besides this, it would be attended with a still worse effect; for, being a bad conductor, it would intercept the heat in its transit from the fire to the water, and would cause the metal of the tube to become unduly heated. Mr. Gurney of course foresaw this inconvenience, and contrived an ingenious chemical method of removing it, by occasionally injecting through the tubes such an acid as would combine with the deposit and carry it away. This method was perfectly effectual, and although its practical application was found to be attended with difficulty in the hands of common workmen, Mr. Gurney was persuaded to adhere to it by the late Dr. Wollaston, until experience proved the impossibility of getting it effectually performed, under the circumstances in which boilers are commonly used. Mr. Gurney then adopted the more simple, but not less effectual, method of removing the deposit by mechanical means. Opposite the mouths of the tubes, and on the other side of the cylinders D and H, are placed a number of holes, which, when the boiler is in use, are stopped by pieces of metal screwed into them. When the tubes require to be cleaned these stoppers are removed, and an iron scraper is introduced through the holes into the tubes, which, being passed backwards and forwards, easily and completely removes the deposit. The boiler may be thus cleaned by a common labourer in half a day, at an expense of about 1*s.* 6*d.*

The frequency of the periods at which a boiler of this kind requires cleaning must depend, in a great degree, on the nature of the water which is used: one in daily use with the water of the river Thames would not require cleaning more than once in a month; but with water of the most unfavourable description, once a fortnight would be sufficient.

[*Lardner on Steam Engines*, 4*th edition.*

¶ *Secrets in Pottery.*

Sir,—Some of your correspondents having inquired concerning pottery glazes, will you submit these *few* recipes of *bodies and glazes*

to their consideration. I have reason to believe that they include nearly all of those in any repute.

Yours, &c.

Hulton Abbey, Burslem, February 29, 1833.

Cream Coloured Bodies—Slip State.

Nos.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Blue clay	37	50	60	75	66	57	56	50	68	67	49	75	82		
Black do.	18	26						23			24			87⅓	90
China do.	28		18		17	23	18	7	14	14	9				
Flint	14	24	20	23	17	16	18	19	18	17	17	25	18	12½	10
Cornwall stone	3		2	2		4	8	1		2	1				
Parts	100														

No. 1 is a good body, much approved in the American market; requires a hard fire. 2 is good for enamelling. 5 is R. Stephenson's body for the Continent; and is good for printing, (for glaze for it see Glazes, No. 13.) 6, Rivers and Clowes', and much approved. The proportions of ball clay are 20 blue, 5 black, 2½ brown; for 7, 3½ blue, 1 china, 1 flint, ½ stone; for 8, 15 blue, 5 black, 1 cracking clay; 14 is for King and Stilt's, through 6 lawn sieve; 15 for Pegs.

Weight per Ale Pint, and Contents.

	oz.	drs.	oz.
Clay slip	26	5	6 of dry clay.
China clay	26	5	
Flint and stone	32	12	22 . . flint.

120 pecks of Flint slip (32 lbs. peck,) are obtained from one ton of raw flint.

E. Wood's Cream-coloured Bodies.

Nos.	1	2	3	4	5	6	7	8
New clay	88	75	84	80	60	66		
Common do.							50	75
China do.					20	16	17	10
Flint	2	10	10	10	15	15	17	10
Cornwall stone	10	15	6	10	5	3	16	5
Parts	100							

The clay slip and stone, 24 oz. to pint; flint 30 oz.

Rodgers' Cream-coloured Bodies.

Nos.	1	2	3	4	5	6	7	8	9
Black clay	36	40	30	34	35	35	30	25	24
Brown do.	25	20	20	16	15	20	16	12	
Blue do.	25	25	15	20	15	10	10	25	48
China do.			15	10	15	20	26	20	
Flint	10	10	15	12	12	13	15	14	24
Cornwall stone	4	5	5	8	8	4	6	4	4
Parts	100								

These serve also for printing, and No. 9 run through a 12 lawn twice, is very good for printed tea ware. The weight per pint is, clay 24 oz., stone 24 oz., flint 30 oz.

Cream-coloured Glazes.

Nos.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Glass	80							4	5			5	16	17	8	80 Red.	38	10		
W. lead		64	60	66	72	55	66	53	57	69	66	66	47	50	75	10	4	30	71	86
Cornwall stone		24	32	4		45	16	16	28	23	22	11	31	25			3	28	9	5
China clay	20			10			2									10				
Dry flint		12	8	20	28		16	27	10	8	12	18	6	8	17		49	9	20	9
Borax																	6	23		
Parts	100																			

Nos.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Glass		5							6		4	5	5							
W. lead	70	55	70	65	62	62	60	60	56	63	58	60	70	70	65	60	63	56	50	54
Cornwall stone	20	30	25	25	20	21	30	35	28	27	20	25	10	8	28	10	18	23	32	25
Dry flint	10	10	5	10	18	10	10	5	10	10	18	10	15	28	7	30	18	23	16	20
Borax																	1	1	2	1
Parts	100																			

No. 2 is Wedgwood's; 7 is for Brown ware; 8 and 11, Wilson's; 10, Toft's; 13, Stephenson's; 27, River's; 37, Spode's; 14, Mr. St. Amands. Most of them are excellent on particular bodies. Mean of the five best—W. lead 65, stone 24, flint 11.

[TO BE CONTINUED.]

¶ *Improvements in Ship Building.*

It is now upwards of twenty years since Sir Robert Seppings introduced into the Royal Navy various improvements in ship building, which are universally allowed to have imparted great additional

strength, safety, and durability, to our ships of war: yet, to use the words of Mr. Knowles, (*Inquiry into the Means which have been taken to Preserve the British Navy,*) such is "the jealousy incident to human nature, in properly appreciating and applying the inventions of others, or the indolence of the mind in not bringing itself to examine new methods or combinations,—these improvements, while they have been eagerly grasped by foreign nations, are but slowly introduced in the ships of our merchants, and, with an apathy hardly to be credited, are totally neglected by the first trading company in Europe, (the East India Company.)" The advantages of the improved system, however, are so manifest and indisputable, that all that was wanting to bring it into general use in the mercantile navy, was, that some influential individual connected with shipping should take it up,—should make it his business to promote its adoption, not only by his own example, but by pressing it in every possible way on the public attention; should do, in short, for the merchants' yards, what Sir Robert Seppings has done for the king's. We are happy to say that such an individual has at length been found in Mr. Ballingall, the author of a very clever and intelligent work, which we have now before us, entitled "The Mercantile Navy Improved."* Mr. Ballingall has brought to the task he has undertaken, not only all the weight of an official situation of considerable prominence, but great practical experience, combined with what seldom accompanies it in men of his class, a very earnest and clear sighted desire of improvement. He candidly acknowledges that "the greater part" of the alterations in construction which he proposes to have adopted in merchant ships, are already "in practice in the Royal Navy;" but he has at the same time enhanced the utility of these alterations by so many new suggestions, and added so many valuable contrivances, entirely his own, that he has a fair claim to be considered as himself an improver of the first order.

We cannot undertake to give, within the limits to which we must needs confine ourselves, the whole details of Mr. Ballingall's system; but we shall endeavour to place in a distinct point of view before our readers, two or three of its more important features.

1. *The filling in of the timbers;* that is, bringing the ribs or frames into one compact body up to the gunwale, claims, on account of the immense consequences dependent upon it, the first place in our consideration. A ship is but an arch of peculiar adaptation, and the strength of every arch is in proportion to the mutual dependence of the parts on each other; but, according to the ordinary mode of building merchant ships, not more than one-half the timbers have such a mutual dependence. Every alternate couple of ribs only is connected together, and the intermediate timbers, (absurdly enough termed *fillings,*) are entirely unconnected with each other, resting only on the

* The Mercantile Navy Improved; or a plan for the greater Safety of Lives and Property in Steam Vessels, Packets, Smacks, and Yatchs, with Explanatory Drawings. By James Ballingall, Manager of the Kirkaldy and London Shipping Company, and Surveyor of Shipping for the Port of Kirkaldy, 1832. Morrison, London.

outer planking, without contributing, in the smallest degree, towards the support of the general structure. This loose and dangerous mode of construction has, at the instance of Sir Robert Seppings, been altogether abandoned in the construction of our ships of war. Every couple of ribs, without exception, is closely connected, and all the smaller interstices, as high as the floor heads, are filled in and caulked; in short, the bottom is converted into one compact solid mass, and that wholly exclusive of the outer planking. It must be evident that a ship thus constructed may sustain very considerable damage in her outer planking—lose actually a plank or two, or even her keel—and yet reach the place of her destination; while the loss of even a portion of a single plank, or of the keel, would be the destruction of a vessel built on the present mode. When water gets once past the outside planking of an ordinary vessel, nothing but the pumps can save it; and should these get choked, or the crew become exhausted in working them, (both very common cases,) she must go down. From numerous illustrative instances adduced by Mr. Ballingall, of the advantage which ships of war possess over merchant vessels in this respect, we quote the following:—

"On or about the same ledge of rocks on which the Wolf sloop of war struck, and lay fast for two nights and a day, in March, 1830, at the back of the Isle of Wight, the vessel, at the time she struck, going at a considerable rate through the water, at the very top of high water of a high spring tide, and with a considerable swell on, and which vessel was got off again, and is now in the East Indies, having been dragged over the rocks for half a mile by assistance from Spithead, the vessel beating very hard upon the rocks with the lift of the sea all the time, the Carn Brea Castle, free trader to India, was lost only a few months before, having got ashore under more favourable circumstances for getting off again. What could this be owing to? The ships were nearly, I believe, of similar tonnage. The answer is plain and obvious. The Wolf had a solid bottom of fifteen inches thick at the keel, being twelve inches of timbers, and three inches of outside plank, without allowing her to have had any ceiling. The Carn Brea Castle would only have an outside bottom plank to protect her, of, I presume, three inches thick. Yet this vessel would have timbers of twelve inches thick, if no more, and a ceiling plank of, I also presume, three inches thick, making three inches more than the sloop of war, but neither of which were of the least use to her in keeping out the water. Had her timbers been close and her ceiling been caulked, she would have had one more protection than the sloop of war, viz. the ceiling plank, without taking any thing from her stowage, and the fair inference is, that she would have been got off and preserved."—p. 97–99.

Mr. Knowles, in a letter to Mr. Ballingall, dated "Navy Office, October 24, 1831," states that "the whole navy proves that the ships with solid bottoms have been more durable than they used to be when openings were left;" and he particularly specifies the case of the Success, which went ashore in Cockburn Sound, when "the whole keel was carried away, also the lower piece of stern, five feet four inches

of the stern-post, four pieces of the dead wood, nine strakes of the bottom, amidships, and many strakes in the bows, and yet this ship was floated off.

Sir Robert Seppings has justly the credit of introducing this practice into the Royal Dock Yards; but when in office he had himself the liberality to point out to Mr. Ballingall, in the model room at the Navy Office, the model of a brig called the Lady Nelson, which was built about 1790, under the directions of Admiral Schanks, on the principle of a perfect union of the timbers, and is now, after a lapse of thirty-two years, still running, and "tight as a bottle."

Mr. Ballingall thinks that "nearly all the vessels which have been lost by foundering and collision, might have been saved, if the vessels had had solid bottoms;" and there can be no question that the loss of life and property from the neglect of this mode of construction, is annually immense.

2. *Caulking the whole of the ceiling, or inner planking of the vessel*, and thus making it water-tight. This is contrary to the practice pursued in the Royal Navy, and, we are induced to think, somewhat superfluous, but is strongly recommended by Mr. Ballingall, on the ground of its affording a double security against a leak. If this, however, be done, it will be naturally asked how any water, which may have got into the vessel from in-board, is to get to the pumps to be pumped out? The answer to this question brings us to Mr. B.'s third important improvement, which consists in—

3. An improvement in the water-courses, by means of what are called percolators.

"I would propose a water-course to be led alongside the kelson on each side, as far forward and aft as may be required from the spring of the vessel raised above the level of the adjoining ceiling, by what I would call percolators, and the bottom of said water-course sunk at least an inch and a half, or more, below the level of the adjoining ceiling, to allow any water which might get into the vessel to drain off the ceiling into this water-course. There should be a gradual acclivity forward and aft, to cause the water to flow readily along the water-courses to the bottom of the pumps. This would be greatly assisted by the spring of the vessel. In men-of-war, East and West India ships, and, in general, in all vessels which either carry no cargoes, or their cargoes in packages, these percolators may be readily made of strong and thick oak battens, fastened to the ceiling close to the water-courses, and raised, say from six or eight inches high above the ceiling, with notches cut in the under edges or sides of them, similar to, I believe, the present practice in the navy. These water-courses to be covered with limber boards, as at present, and the boards would not be required to be tight on the top; the boards to be slipped up to the kelson."—p. 20.

Mr. Ballingall does not propose these percolators simply because they obviate the objection before stated to the caulking of the ceiling, but for this further reason, that, whether the ceiling is caulked or not, they furnish a better means of conveying the water to the pumps,

and keeping the pumps clean than any now in use, while at the same time they contribute considerable additional stability to the vessel.

Among the subordinate advantages attending this improved system of ship building, there are two which are particularly deserving of notice: one is the greater security from fire which it affords, in consequence of all the vacancies, which at present act as so many funnels to the flame, being filled up; and the other, the protection obtained from vermin, in consequence of their being no harbour left for them between the timbers and the inside and outside planks.

Various objections to the system will naturally suggest themselves to the minds of practical men; it is certain, also, that the improvements which it embraces are not equally applicable to all merchant ships: but before any ship-builder or ship-owner rejects it on either account, we would earnestly advise him to send for Mr. Ballingall's book, where he will find nearly every possible objection very frankly discussed, and every modification which particular circumstances may call for, provided for with great intelligence and ability.

We perceive, from a letter which Mr. B. has published, from Messrs. Ogilvie and Crichton, of Leith, the builders of the Royal Adelaide steam-ship, (one of those which ply between London and Edinburgh,) that she has been built, in most respects, upon the plan now recommended," and that it is the intention of the company to which it belongs to adhere to that plan "in any vessels which they may hereafter build." We trust that so judicious and spirited an example will not be long without numerous imitators.

Mr. B.'s book contains also instructions for rendering vessels, already built on the present plan, more secure, at a cheap rate. He particularly recommends a revival of the plan of placing a doubling on ships, as was proposed as far back as 1792, by Mr. Snodgrass, surveyor of shipping to the East India Company. Mr. S.'s plan was "that no ship should have a thorough repair; but instead of this, that its bottoms and upper works should be doubled with three inch oak plank, from keel to gunwale, and strengthened with knees, standards, and even iron riders, if necessary, all which might be done at a small expense." Mr. S. thought that ships so repaired would "be stronger and safer, and be able to keep the seas longer in the worst weather, than new ships," (that is, new ships on the old construction;) and in this opinion Mr. Ballingall perfectly concurs. The company of which Mr. B. is manager have had two of their smacks, the Enterprize and the Fifeshire, thus doubled; and it appears from the following paragraph, which we extract from the Scotsman of the 28th November last, that the result has been most satisfactory:—

"We understand that since the Kirkaldy and London Shipping Company's smacks, Enterprise and Fifeshire, have been fitted with double bottoms, they have frequently been deeply laden—have encountered very stormy and tempestuous weather—and were both at sea during the late very severe storm on the 10th current, when so many vessels were wrecked, and have not admitted a drop of water through their bottoms or sides.

[*Mech. Mag.*

¶ POPULAR SCIENCE.

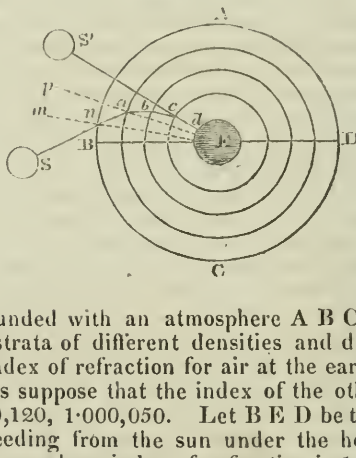
No. IV.

Selections from Brewster's Optics.

On unusual Refraction.

The atmosphere in which we live is a transparent mass of air possessing the property of refracting light. We learn from the barometer that its density gradually diminishes as we rise in the atmosphere, and, as we know from direct experiment that the refractive power of air increases with its density, it follows that the refractive power of the atmosphere is greatest at the earth's surface, and gradually diminishes till the air becomes so rare as scarcely to be able to produce any effect upon light. When a ray of light falls obliquely upon a medium thus varying in density, in place of being bent at once out of its direction, it will be gradually more and more bent during its passage through it, so as to move in a curve line, in the same manner as if the medium had consisted of an infinite number of strata of different refractive powers. In order to explain this, let E, fig. 129, be

Fig. 129.



the earth, surrounded with an atmosphere A B C D, consisting of four concentric strata of different densities and different refractive powers. The index of refraction for air at the earth's surface being 1·000,294, let us suppose that the index of the other three strata is 1·000,200, 1·000,120, 1·000,050. Let B E D be the horizon and let a ray S *n*, proceeding from the sun under the horizon, fall on the outer stratum at *n*, whose index of refraction is 1·000,050. Drawing the perpendicular E *n m*. find by the rule formerly given the angle of refraction, E *n a*, corresponding to the angle of incidence S *n m*. When the ray *n a* falls on the second stratum at *a*, whose index of refraction is 1·000,120, we may in like manner, by drawing a perpendicular E *a p*, find the refracted ray *a b*. In the same way the refracted rays *b c* and *c d* may be found. The same ray S *n* will therefore have been refracted in a polygonal line *n a b c d*, and as it reaches the eye in the direction *c d*, the sun will be seen in the direction *d c* S′, ele-

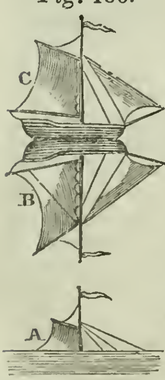
vated above the horizon, by the refraction of the atmosphere, when it is still below it. In like manner it might be shown that the sun appears above the horizon by refraction, when he is actually below it at sunset.

Although the rays of light move in straight lines *in vacuo* and in all media of uniform density, yet, on the surface of the globe, the rays proceeding from a distant object, must necessarily move in a curve line, because they must pass through portions of air of different densities and refractive powers. Hence it follows that, excepting in a vertical line, no object, whether it is a star or planet beyond our atmosphere, or actually within it, is seen in its real place.

Excepting in astronomical or trigonometrical observations, where the greatest accuracy is necessary, this refraction of the atmosphere does not occasion any inconvenience. But since the density of the air and its refractive power vary greatly when heated or cooled, great local heats or local colds will produce great changes of refractive power, and give rise to optical phenomena of a very interesting kind. Such phenomena have received the name of *unusual refraction*, and they are sometimes of such an extraordinary nature as to resemble more the effects of magic than the results of natural causes.

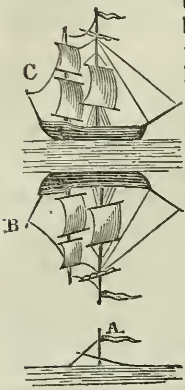
The elevation of coasts, mountains, and ships, when seen over the surface of the sea, has long been observed and known by the name of *looming*. Mr. Huddart described several cases of this kind, but particularly the very interesting one of an *inverted image* of a ship seen beneath the real ship. Dr. Vince observed at Ramsgate a ship whose topmasts only were seen above the horizon; but he at the same time observed, in the field of the telescope through which he was looking, two images of the complete ship in the air, both directly above the ship, the uppermost of the two being erect and the other inverted. He then directed his telescope to another ship whose hull was just in the horizon, and he observed a complete inverted image of it; the mainmast of which just touched the mainmast of the ship itself. The first of these two phenomena is shown in fig. 130. in which A is the real ship, and B, C the images seen by unusual refraction. Upon looking at another ship, Dr. Vince saw inverted images of some of its parts which suddenly appeared and vanished, "first appearing," says he, "below, and running up very rapidly, showing more or less of the masts at different times as they broke out, resembling in the swiftness of their breaking out the shooting of a beam of the aurora borealis." As the ship continued to descend, more of the image gradually appeared, till the image of the whole ship was at last completed, with the mainmasts in contact. When the ship descended still lower, the image receded from the ship but no second image was seen.

Fig. 130.



Dr. Vince observed another case, shown in fig. 131, in which the sea was distinctly seen between the ships B, C. As the ship A came above the horizon, the image C gradually disappeared,

Fig. 131.



and during this time the image B descended, but the ship did not seem so near the horizon as to bring the mainmasts together. The two images were visible when the whole ship was beneath the horizon.

Captain Scoresby, when navigating the Greenland seas, observed several very interesting cases of unusual refraction. On the 28th of June, 1820, he saw from the mast-head eighteen sail of ships at the distance of about twelve miles. One of them was drawn out, or lengthened, in a vertical direction; another was contracted in the same direction; one had an inverted image immediately above it; and other two had two distinct inverted images above them, accompanied with two images of the strata of ice. In 1822, Captain Scoresby recognised his father's ship, the Fame, by its inverted image in the air, *although the ship itself was below the horizon.* He afterwards found that the ship was seventeen miles beyond the horizon, and its distance thirty miles. In all these cases, the image was directly above the object; but on the 17th of September, 1818, MM. Jurine and Soret observed a case of unusual refraction, where the image was on one side of the object. A bark about 4000 toises distant was seen approaching Geneva by the left bank of the lake, and at the same moment there was seen above the water, an image of the sails, which, in place of following the direction of the bark, receded from it, and seemed to approach Geneva by the right bank of the lake; the image sailing from east to west while the bark was sailing from north to south. The image was of the same size as the object when it first receded from the bark, but it grew less and less as it receded, and was only one-half that of the bark when the phenomena ceased.

While the French army was marching through the sandy deserts of Lower Egypt, they saw various phenomena of unusual refraction, to which they gave the name of *mirage.* When the surface of the sand was heated by the sun, the land seemed to be terminated at a certain distance by a general inundation. The villages situated upon eminences appeared to be so many islands in the middle of a great lake, and under each village there was an inverted image of it. As the army approached the boundary of the apparent inundation, the imaginary lake withdrew, and the same illusion appeared round the next village. M. Monge, who has described these appearances in the *Mémoires sur l'Egypte*, ascribes them to reflexion from a reflecting surface, which he supposes to take place between two strata of air of different densities.

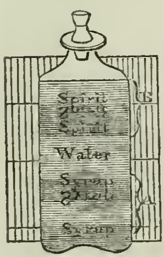
One of the most remarkable cases of mirage was observed by Dr. Vince. A spectator at Ramsgate sees the tops of the four turrets of Dover Castle, over a hill between Ramsgate and Dover. Dr. Vince, however, on the 6th of August, 1806, at seven P. M., saw *the whole of Dover Castle*, as if it had been brought over, and placed on the

Ramsgate side of the hill. The image of it was so strong that the hill itself was not seen through the image.

The celebrated *fata morgana*, which is seen in the straits of Messina, and which for many centuries astonished the vulgar and perplexed philosophers, is obviously a phenomenon of this kind. A spectator on an eminence in the city of Reggio, with his back to the sun and his face to the sea, and when the rising sun shines from that point whence its incident ray forms an angle of about forty-five degrees on the sea of Reggio, sees upon the water numberless series of pilasters, arches, castles well delineated, regular columns, lofty towers, superb palaces with balconies and windows, villages and trees, plains with herds and flocks, armies of men on foot and on horseback, all passing rapidly in succession on the surface of the sea. These same objects are, in particular states of the atmosphere, seen in the air, though less vividly; and when the air is hazy, they are seen on the surface of the sea, vividly coloured, or fringed with all the prismatic colours.

That the phenomena above described are generally produced by refraction through strata of air of different densities may be proved by various experiments. In order to illustrate this, Dr. Wollaston poured into a square phial, (fig. 132,) a small quantity of clear syrup, and above this he poured an equal quantity of water, which gradually combined with the syrup, as seen at A. The word *Syrup* upon a card held behind the bottle appeared erect when seen through the pure syrup, but inverted, as represented in the figure, when seen through the mixture of water and syrup. Dr. Wollaston then put nearly the same quantity of *rectified spirit of wine* above the water, as in the same figure at B, and he saw the appearance there represented, the true place of the word *Spirit*, and the inverted and erect images below.

Fig. 132.



Analogous phenomena may be seen by looking at objects over the surface of a hot poker, or along the surface of a wall or painted board heated by the sun.

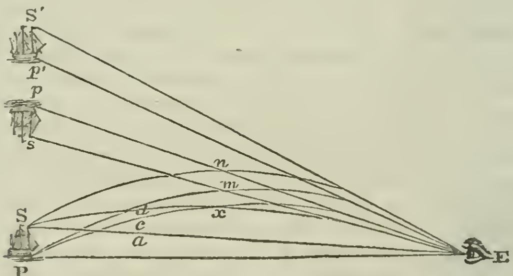
The late Mr. H. Blackadder has described some phenomena both of vertical and lateral mirage as seen at King George's Bastion, Leith, which are very instructive. The extensive bulwark, of which this bastion forms the central part, is formed of huge blocks of cut sandstone, and from this to the eastern end the phenomena are best seen. To the east of the tower the bulwark is extended in a straight line to the distance of 500 feet. It is eight feet high towards the land, with a footway about two feet broad, and three feet from the ground. The parapet is three feet wide at top, and is slightly inclined towards the sea.

When the weather is favourable, the top of the parapet resembles a mirror, or rather a sheet of ice; and if in this state another person stands or walks upon it, an observer at a little distance will see an inverted image of the person under him. If, while standing on the footway, another person stands on it also, but at some distance, with his face turned towards the sea, his image will appear opposite to him, giving the appearance of two persons talking or saluting each other.

If, again, when standing on the footway, and looking in a direction from the tower, another person crosses the eastern extremity of the bulwark, passing through the water gate, either to or from the sea, there is produced the appearance of two persons moving in opposite directions, constituting what has been termed a lateral mirage: first one is seen moving past, and then the other in an opposite direction with some interval between them. In looking over the parapet distant objects are seen variously modified; the mountains (in Fife) being converted into immense bridges; and on going to the eastward extremity of the bulwark, and directing the eye towards the tower, the latter appears curiously modified, part of it being, as it were, cut off and brought down, so as to form another small and elegant tower in the form of certain sepulchral monuments. At other times it bears an exact resemblance to an ancient altar, the fire of which seems to burn with great intensity.*

In order to explain as clearly as possible how the erect and inverted image of a ship is produced as in fig. 131, let S P (fig. 133) be a

Fig. 133.



ship in the horizon, seen at E by means of rays S E, P E, passing in straight lines through a track of air of uniform density lying between the ship and the eye. If the air is more rare at c than at a, which it may be from the coldness of the sea below a, its refractive power will be less at c than at a. In this case, rays S d, P c, which, under ordinary circumstances, never could have reached the eye at E, will be bent into curve lines P c, S d; and if the variation of density is such that the uppermost of these rays S d, crosses the other at any point x, then S d will be undermost, and will enter the eye E as if it came from the lower end of the object. If E p, E s, are tangents to these curves or rays, at the point where they enter the eye, the part S, of the ship will be seen in the direction E s, and the part P in the direction E p; that is, the image $s\,p$ will be *inverted.* In like manner, other rays, S n, P m, may be bent into curves S n E, P m E, which do not cross one another, so that the tangent E s' to the curve or ray S n will still be uppermost, and the tangent E p' undermost. Hence the observer at E will see an erect image of the ship at s' p' above the inverted image sp, as in fig. 131. It is quite clear that the state of the air may be such as to exhibit only one of these images, and that these

* Edinburgh Journal of Science, No. V. p. 13.

appearances may be all seen when the real ship is beneath the horizon.

In one of Captain Scoresby's observations we have seen that the ship was drawn out, or magnified, in a vertical direction, while another ship was contracted, or diminished, in the same direction. If a cause should exist, which is quite possible, which elongated the ship horizontally at the same time that it elongated it vertically, the effect would be similar to that of a convex lens, and the ship would appear magnified, and might be recognised at a distance far beyond the limits of unassisted vision. This very case seems to have occurred. On the 26th of July, 1798, at Hastings, at 5, P M., Mr. Latham saw the French coast, which is about forty or fifty miles distant, as distinctly as through the best glasses. The sailors and fishermen could not at first be persuaded of the reality of the appearance; but as the cliffs gradually appeared more elevated, they were so convinced that they pointed out and named to Mr. Latham the different places which they had been accustomed to visit; such as the bay, the windmill at Boulogne, St. Vallery, and other places on the coast of Picardy. All these places appeared to them as if they were sailing at a small distance into the harbour. From the eastern cliff or hill, Mr. Latham saw at once Dungeness, Dover cliffs, and the French coast, all the way from Calais, Boulogne, on to St. Vallery, and, as some of the fishermen affirmed, as far as Dieppe. The day was extremely hot, without a breath of wind, and objects at some distance appeared greatly magnified.

This class of phenomena may be well illustrated, as I have elsewhere* suggested, by holding a mass of heated iron above a considerable thickness of water, placed in a glass trough, with plates of parallel glass. By withdrawing the heated iron, the gradation of density increasing downwards, will be accompanied by a decrease of density from the surface, and through such a medium the phenomena of the mirage may be seen.

That some of the phenomena ascribed to unusual refraction are owing to unusual reflection, arising from difference of density, cannot, we think, admit of a doubt. If an observer, beyond the earth's atmosphere at S, fig. 129, were to look at one composed of strata of different refractive powers as shown in the figure, it is obvious that the light of the sun would be reflected at its passage through the boundary of each stratum, and the same would happen if the variation of refractive power were perfectly gradual. Well described cases of this kind are wanting to enable us to state the laws of the phenomena; but the following fact, as described by Dr. Buchan is so distinct, as to leave no doubt respecting its origin. "Walking on the cliff," says he, "about a mile to the east of Brighton, on the morning of the 18th of November, 1804, while watching the rising of the sun, I turned my eyes directly towards the sea, just as the solar disk emerged from the surface of the water, and saw the face of the cliff on which I was standing represented *precisely opposite to me* at some distance on the ocean. Calling the attention of my companion

* Edinburgh Encyclopedia, art. Heat.

to this appearance, we soon also discovered our own figures standing on the summit of the opposite apparent cliff, as well as the representation of a windmill near at hand. The reflected images were most distinct precisely opposite to where we stood, and the false cliff seemed to fade away, and to draw near to the real one, in proportion as it receded towards the west. This phenomenon lasted about ten minutes, till the sun had risen nearly his own diameter above the sea. The whole then seemed to be elevated into the air, and successively disappeared, like the drawing up of a drop scene in a theatre. The surface of the sea was covered with a dense fog of many yards in height, and which gradually receded before the rays of the sun. The sun's light fell upon the cliff at an incidence of about 73° from the perpendicular."

Meteorological Observations for May, 1833.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Dew point	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches.				Inches.	
	1	51°	71°	30.05	30.00	44°	NE.	Moderate.		Cloudy—hazy.
	2	50	81	29.96	29.90	59	SE. W.	do.		Cloudy—hazy.
☺	3	45	68	30.10	30.13	28	E. SSE.	do.		Cloudy—hazy.
	4	42	52	.14	.14	36	S. SW.	do.		Light clouds—cloudy—rain.
	5	48	64	.00	.00	50	W. NE.	do.	0.11	Drizzle—flying clouds.
	6	49	70	.10	.60	50	SE. S.	do.		Fog—clear.
	7	52	84	.00	29.90	61	SW. S.	Brisk.		Foggy—clear.
	8	61	86	29.90	.80	60	SW.	do.		Cloudy—clear.
	9	64	84	.80	.86	48	NE.	do.		Clear day.
	10	50	61	30.00	30.04	48	E.	do.		Cloudy—drizzle.
☾	11	51	61	29.90	29.90	65	SE.	Moderate.	0.85	Rainy day.
	12	61	79	.90	.90	63	S.	do.		Cloudy—flying clouds.
	13	65	81	.85	.85	64	S.	do.	0.05	Cloudy—shower.
	14	65	80	.90	.90	66	S.	do.		Cloudy—flying clouds.
	15	66	68	.83	.90	65	S.	do.	1.15	Drizzle—rain.
	16	62	58	.95	30.00	63	SE. E.	do.	0.73	Fog—rain.
	17	56	75	.80	29.80	56	E.	do.		Cl'dy: clear: Aurora Borealis.
	18	68	84	.80	.80	69	W.	do.		Cloudy—clear.
⊗	19	75	85	.78	.78	66	W.	do.		Clear day.
	20	68	62	.76	.44	66	W.	Brisk.	2.40	Rain.
	21	68	74	.67	.57	72	W.	Moderate.	0.50	Rain.
	22	68	78	.70	.70	58	W.	do.		Clear day.
	23	66	74	.94	30.00	61	W.	do.		Cloudy—clear.
	24	68	66	30.10	.20	54	W.	do.		Cloudy—clear.
☽	25	55	60	.00	29.94	57	E.	do.		Cloudy day.
	26	56	78	29.83	.80	63	E.	do.		Cloudy—clear.
	27	66	68	.75	.75	61	E.	do.	0.01	Cloudy—rain.
	28	57	66	.84	.90	62	SE.	do.		Cloudy day.
	29	69	72	.90	.70	61	SE.	do.	0.31	Fog—cloudy—rain.
	30	54	67	.70	.75	50	W.	Brisk.		Flying clouds—do.
	31	51	73	.85	.90	52	W.	do.		Flying clouds—do.
	Mean	58.93	74.51	29.90	29.88	57.2			6.11	

	Thermometer.	Barometer.
Maximum height during the month,	86. on 8th.	30.20 on 24th.
Minimum do. . . .	42. on 4th.	29.44 on 20th.
Mean do. . . .	66.72 . .	29.89

JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

AUGUST, 1833.

Remarks on Colonel Long's Locomotive Engine.

We have been gratified at meeting with the following notices in two of the Philadelphia papers, and in the absence of more particular information respecting this locomotive engine, we have thought them worthy of publication in the Journal. We have noticed this engine in our list of patents in the present number, p. 22. This notice was written five months ago, and the distance of the Editor from Philadelphia, has prevented all personal examination of the engine; he is informed, however, that the inventor has found it necessary to increase the heating surface of his boiler; should this information prove to be correct, the Editor may take to himself some credit for having anticipated the necessity of this change. Should this not have been found necessary, so much the better, as the inventor will have been saved the trouble and expense of so doing, and the Editor will be more pleased than mortified at being, in the present instance, a false prophet. We know of no one who is more deserving of success than Colonel Long, both from the qualities of his mind, and the perseverance with which he has devoted both it and his purse to the accomplishment of his purpose. Editor.

Locomotive Engine.

Philadelphia, June 7.

The locomotive engine, called the Pennsylvania, invented and patented by Colonel S. H. Long, of the United States Army, has been fairly tried and approved on the Germantown rail-road.

Recent experiments have shown that the engine is fit to draw thirty-two tons, easily, on a level road, at the speed of fifteen miles an hour.

The whole weight of the engine is four tons and a half, the boilers evaporate two hundred gallons in an hour, in which time they require the consumption of something less than two bushels of anthracite coal, the only fuel used.

The wheels are made of wood, each with an iron tire of three parallel, concentric, circular bands, cheap in price, but very substantial, strong, lasting, and efficient.

Colonel Long has employed himself, for some time past, on experiments for the application of the heat produced by anthracite coal to the production of steam for locomotive engines, and has succeeded in a degree above the most sanguine expectations with which he started. With his arrangement of the furnace and the flue, anthracite may be used for raising steam, more advantageously than the best pine wood. It sends forth no sparks to burn or alarm passengers careful of their dresses; and emits no disagreeable or pernicious vapour; and it enables the director to travel without the encumbrance of a tender, as the fuel and the water are both carried on the engine. [*Daily Chron.*

Locomotive Engine.

Colonel Long's engine is now in successful operation on the Philadelphia, Germantown, and Norristown rail-road. Colonel Long deserves great credit for the genius, patience, and unremitting perseverance which he has displayed in bringing into operation this beautiful machine. Its principal merits consist in its light weight, and the consumption, as fuel, of *our anthracite coal.* The engine weighs four tons and three-quarters with her fuel and water, carrying no tender, as her water tanks are on the top of the machine. Col. Long has been for a considerable time experimenting on the subject of the use of anthracite coal for fuel, and has met with repeated failures and disappointments.

This enterprising gentleman, however, not discouraged by these circumstances, persevered, and has at last realized the complete success of this valuable improvement, which not only obviates the emission of sparks and smoke, but establishes a most economical, and, therefore, highly valuable, improvement. We advise our citizens to examine it. The company deserve credit for the facilities which they have afforded for the development of the invention.

[*U. S. Gaz.*

Arrangement for stopping sparks from the flues of locomotive engines in which wood is used as fuel. By J. M'ILVAINE.

TO THE COMMITTEE ON PUBLICATIONS.

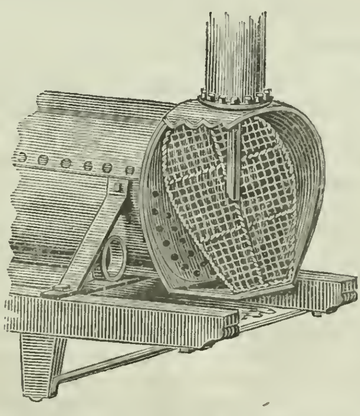
GENTLEMEN,—I respectfully submit for publication the following observations upon a subject which is of some importance to proprietors of locomotive engines in this country.

A failure of the preceding efforts at arresting the sparks from the chimnies of locomotives in which wood is used as fuel, may be thus estimated or explained.

A boiler containing ninety-six tubes, each one inch and a half in area will afford a space for the passage of vapour equal to one foot square. A chimney twelve inches in diameter, has an area of rather more than three-fourths of a square foot, consequently the vapour, without taking into account the space required for the escape steam, must move through the chimney with an increased velocity, which, if checked, will seriously impede the draught. Thus it is easy to see that it is improper to place a wire net at the base of the chimney; this contracts an opening already small, and which cannot, with propriety, be much enlarged beyond the dimension supposed.

A still stronger objection may be urged against placing a wire basket on the top of the chimney. The velocity with which the vapour and escape steam are driven out, cause them to impinge, with considerable force, against the wires, whence their particles rebound and so obstruct each other, and should a spark be retained, it will but increase the previous evil. Again, the openings between the wires are, necessarily, so placed, that but few of them present a free passage for the smoke.

These objections will, I flatter myself, be effectually obviated, by placing a screen of wire in the smoke chamber, as seen in the accompanying figure; the diagonal position allows a net of ten times the area of the flues, while almost all the vapour will come in contact with it nearly at right angles; if we allow one-half for retardation, we still require but one-fifth the velocity of the draught through the flues, and one-sixth of that in the chimney, a retardation which seems to be amply sufficient to allow the burning coals to fall; if, however, these are retained on the wires, not having the steam and condensed water thrown upon them, they will be consumed.



It seems probable that most of the sparks which escape, are those

which have passed through the upper flues, and striking the front plate have rebounded, and are caught by the vapour while it is gathering into the foot of the chimney, which it must do with considerable velocity.

If this supposition be correct, the net placed at the base of the chimney would retain the sparks to the obvious injury of the draught, as the velocity of the current will hold them against the net until consumed, that being the most contracted part of the chimney owing to the fact that the escape pipe rises above this place. To put the net-work above the steam pipe, would be worse than to use the basket on the top of the chimney.

Respectfully yours,
J. M'Ilvaine,
No. 19, *St. James Street*, *Philadelphia.*

Description of a Percussion Lock for Cannon, adopted from the French service, by Benjamin Huger, *Captain of U. S. Ordnance Corps.*

(Communicated by Prof. A. D. Bache.)

Gentlemen,—I offer to you for publication a description of a percussion gun lock for cannon, received from my friend Capt. Huger, of the Ordnance. This lock has been tested in the French service, and since its introduction into our own by Capt. Huger, has been the subject of experiment at Old Point Comfort: the experiments, I am assured, have proved satisfactorily that the lock will answer perfectly the purpose for which it was intended.

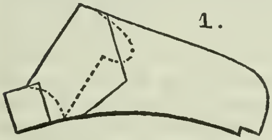
Very respectfully, yours,
A. D. Bache.

Description of a Percussion Lock for Cannon.

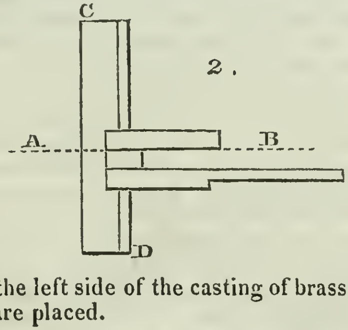
The determination of the best mode of applying percussion locks to cannon, has for some years past occupied the attention of many persons. The great advantage of this kind of lock for cannon may be rendered evident, without entering into details, by a statement of the facts that it dispenses with the following implements, which are now attached to all guns, viz. the lintstock and port-firestock, the slow-match and port-fire, and renders unnecessary the operation of pricking and priming, while the certainty, accuracy, and rapidity of the fire are increased. From the necessary size of the vent of a cannon, the blast which is forced upwards through the vent at the moment of the explosion of the charge, is so great that it destroys any lock that remains within the influence of its force. It has, therefore, been found absolutely indispensable that the lock should be so constructed, that the hammer, after striking and exploding the primer, shall be immediately removed beyond the reach of the blast from the vent. Lieut. Ring-

gold, in 1831, presented a lock constructed upon this principle. The hammer had a double movement, and after striking and exploding the primer, was acted upon by a lateral spring and moved without the reach of the blast. This lock was submitted to experiment at Fort Monroe, under the superintendence of a Board of officers. It stood the test of the experiment, and the only objection that could be made to it was its great cost, and the extreme nicety required in its construction. In July, 1832, the French frigate La Flore came into Hampden Roads, and the captain, while on a visit to this Fort, stated, in conversation, that he had percussion locks to his guns. I shortly after went on board the frigate, and was politely allowed by Capt. Le Blanc to take a sketch of his lock, from which I had others made. I mentioned to you in a former letter that I had this lock, and I should have sent you a description of it before, but I wished to test it fully, and to be thoroughly convinced that it answered all the purposes required, before I laid it before you. Capt. Le Blanc informed me that it had been adopted by the French government, that all the ships were provided with them, and that all the batteries at Brest were armed with them. He could not inform me if they were used in all their garrisons, as Brest was the only one which he had visited since their adoption. The locks were stamped with the name of Potter, the inventor. I have made several of these locks and adapted them to guns with or without raised vent fields, and of all calibres, and have found them to succeed perfectly in all cases; the fire is certain, and the locks remain uninjured by use, or by the action of the blast from the vent. The drawing I now send you is the copy of one used on a 42 pound gun, with a raised vent-field.

The idea which gave rise to the construction of this lock, was that of placing it crosswise on the gun. In all others the lock is made to lay parallel to the length of the gun; this lock, on the contrary, is placed at right angles to the axis of the gun, and a plane passing through the centre of the casting, shown by fig. 2, would pass through the centre of the exterior orifice of the vent, and cut a circle out of the gun.



1.



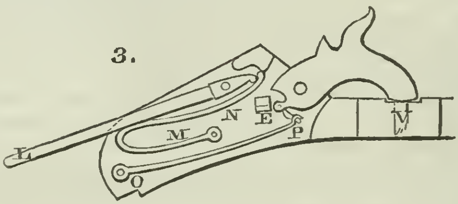
2.

Fig. 1* shows the elevation of the left side of the casting of brass on which the hammer and springs are placed.

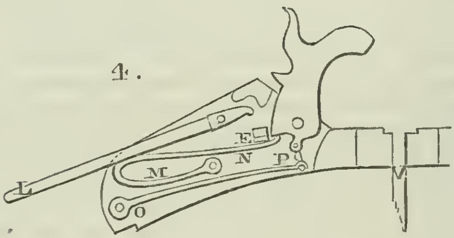
* The cuts are on one-fourth the scale of the original drawings.—COM. PUB.

Fig. 2, is a horizontal projection of the casting. The hammer works between the two sides of the castings, and the springs are attached to the interior of the left side. The lock is attached to the gun with a raised vent-field, by two screws, fig. 9, which pass through the front of the casting C D, and the vent-field, and are clamped by a nut on the opposite side. To guns without raised vent-fields, it is attached by two short stout screws passing vertically through the castings, C D, and into the metal of the gun.

3.



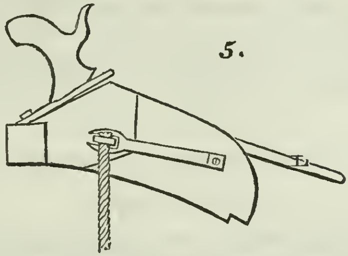
4.



Figs. 3 and 4, are exterior views of the lock, supposed to be sections on the line A B of the casting. Suppose the lock to be attached crosswise on the gun, (see figs. 3 and 4.) The main spring M N, in its natural position, is represented in fig. 3. The small spring O P, in its natural position, is represented in fig. 4; by the action of the small spring on the stirrup attached to the end of the hammer, this latter stands in the position represented in fig. 4. To cock the lock, push the hammer down on the vent, overcoming the action of the small spring, O P, fig. 3, which is slight, sieze the end of the lever L and raise the lever; this will force the main-spring down over the catch, fig. 7, the end of which projects through the mortice E. This catch is kept in its position by the outside spring shown in fig. 5, and in detail in fig. 8. Let go the lever, the lock is then cocked, as represented in fig. 4. To fire, place a percussion primer on the vent, sieze the string attached to the other end of the catch represented in fig. 5, pull it, and this withdraws the catch from over the main-spring which immediately flies up to assume its natural position, driving the hammer down upon the vent with great force, and exploding the primer. Its length is so adjusted that as soon as the ham-

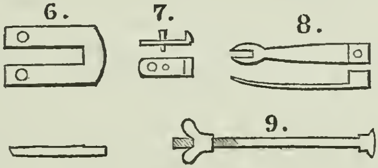
mer strikes the vent, the main-spring clears the end of it, and the

5.



action of the small spring causes the hammer instantaneously to resume the position in which it is represented in fig. 4, and the blast from the vent passes entirely clear of it. Fig. 6 represents a plate of steel which is attached to the front of the casting by two screws; it serves to receive the jar of the hammer when it is jerked back to its position by the action of the small spring O P.

6. 7. 8. 9.



The drawing shows by what a simple contrivance the hammer is made to escape the blast of the vent, and a slight inspection of it will show how perfectly simple all the parts are, and consequently how easily and cheaply they may be constructed. From comparing this lock with the common musket lock, I am of opinion that two of these locks could be constructed for the same cost as one musket lock. The lock is not liable to get out of repair, and should any part be damaged it could be easily replaced.

Benjamin Huger,
Capt. U. S. Ordnance.

FRANKLIN INSTITUTE.

Fourth Monthly Meeting for Conversation on Mechanical Subjects.

Doctor Ebenezer Cooley explained a plan devised by him for supplying the city of New York with water: the plan is intended to save the expense which would be incurred in the erection of a large aqueduct.

It will be submitted to the committee on inventions for examination.

Prof. A. D. Bache exhibited the drawings of a French percussion lock for cannon, which has been introduced into the United States' service by Capt. Huger, of the Ordnance. The drawings and description are given in the preceding article.

Both subjects produced matter of an instructive kind in the way of discussion and remark.

BIBLIOGRAPHICAL NOTICE.

Flint's Lectures.

Lectures upon Natural History, Geology, Chemistry, the Application of Steam, and Interesting Discoveries in the Arts. By Timothy Flint.

Nothing is more dangerous to a just appreciation of one's powers, than for a man to find himself at the head of a party or coterie; and within certain bounds, the smaller the latter is, the greater the danger. An illustration of the truth of this remark is shown in the appearance of the work the title of which is at the head of this article. Mr. Flint had been known, and we believe favourably so, as the author of a work on the Valley of the Mississippi, and of another of which we saw a favourable review in a respectable British journal. But he unfortunately appears to have thought himself a *lion in the prairies*, and the result has been as above. A western *brother*, in an admirable article,* has observed upon some of the more remarkable points of the natural history of the work, such as the magnifying eyes of the horse, the hair turned into a water snake, the wonderful fact of a dog's eyes being useless to the owner thereof, &c. Our remarks will, therefore, be confined to some of the prominent points in the chemical and physical branches. In these the definitions and general classifications are usually excellent. Bodies through which the light passes freely are called transparent. Those which *retain* the light are named *opaque*. p. 25.

In this sense we presume it to be that metallic mirrors are opaque, they *reflect* all the light that falls upon them, and therefore, we presume, *absorb* it. So, likewise, the moon is opaque, retaining all the light that falls upon it from the sun, and giving no light to the earth.

> "The mineral acids have known and simple bases; the vegetable acids have *double* bases; and the animal acids have *triple* bases. They are decomposed by combustible substances, *and with metals, form oxides*."—p. 59.

We had supposed that oxides were compounds of bases with oxygen, but are glad to learn, and are particularly pleased with the lucid exposition of the nature of mineral, vegetable, and animal acids!

The happy illustration of what constitutes an acid is but little exceeded by the judicious selection of the alkalies with metallic bases, embraced in the following paragraph.

* Western Monthly Review.

"The alkalies are potash, soda, ammonia, and lithia, of which the three first are known to have metallic bases."—p. 59.

A few other examples will suffice to give fair specimens of Mr. Flint's facts and philosophy. Fact,—Acids "administered in a concentrated form, are strong poisons, for which the remedy is the application of *alkalies drunk in solution*," (p. 60,) and then we suppose the remedy for the alkali is a little more acid.

Philosophy,—

"The most important *mechanical* agent in chemical processes is sulphuric acid."—p. 60.

Philosophy,—

"There are two forms of affinity. The first is that which only takes place between bodies of the same nature, and is named the attraction of aggregation. *Two* drops of water, and a *cube* of gold are aggregations."—p. 58.

Heat, or, as our author loves to term it, caloric, is a very simple matter; but there is a mystery about it which is seemingly inexplicable.

"There is another universal law, apparently the exact reverse of affinity, which incessantly tends to separate those bodies which that principle holds together. The cause of it is a subtle element diffused through the universe, which is called caloric; *but by a seemingly inexplicable mystery, both principles appear to proceed from the same body, the sun.*"—p. 62.

The history of the Greek fire is unique, it has been hitherto supposed to be a subject admitting of some of the labour of the commentator.

"The Greek fire was discovered in the seventh century by Callinicus, a Greek engineer, and was lost from that time to the reign of Louis XV. of France. It was then discovered anew by Duprè. This terrible fire also has been prepared by Sir Humphrey Davy. Thenard composed it of charcoal, iron, and calcined potash. By the re-union of the iron and potash, a hydrate of potash is produced."—p. 79.

We can hardly italicise here, for it has been said that these catches to attention lose their effect when too frequently repeated.

Mr. Flint is a man who is not afraid of questioning; thus, "you will ask me, perhaps, why Providence has departed from its general economy to water Egypt in this remarkable way," (p. 120,) he is the only person who has ever ventured to dispute supremacy with the old lady who used to collect her dependants around her every evening, to determine for their benefit what weather they were to have the next day.

Philosophy and fact:—

"At this day" it appears that "the fair pupils of our female schools can explain the phenomenon, (viz. *why fuel made fire*,) that confounded Voltaire."

It appears that—

"To set wood or coal on fire is to cause it to absorb oxygen from the atmosphere, and to liberate the azote combined with it. You divine at once what becomes of the caloric which was combined with the oxygen of the air. In the same proportion as the oxygen appears in a sensible form there is a disengagement of light and heat. We see, then, that the heat of a body in combustion is

produced by the atmosphere which surrounds us, and not by the burning body itself."--p. 126.

If the explanation of combustion is satisfactory, those are even more so, which relate to the natural phenomena, earthquakes, water spouts, volcanoes, and meteoric stones, for they "seem to owe their origin to the different aerial elements in combination with carbonic acid."—p. 135.

But I ask no more space for such sheer folly; a point of much greater importance is the influence that the work might exercise on any class in which it might unfortunately obtain circulation. I mean the ramblings of the writer from one subject to another, guided by the merest accidental resemblances, or the most fanciful analogies; not excepting in these flights a subject the highest that can interest humanity, and which should be spared from the reveries of a christian minister at least. But seeing in Mr. Flint's case, as the writer believes he does, the operation of a general law founded on human weakness, to which all must in part yield, he is fain to believe him curable; but for this he must be left to himself; self-examination alone can show him whether he has been employing his talents in the way most profitable to the community; and whether he, with the influence which he possesses, or might possess, in the west, and with the consequent power of effecting so much good, is not *responsible* for abuse of time and talents. The writer therefore leaves him, with a promise to be the first to hail with pleasure any future effort of his which may counteract the possible bad effect of the present. W.

Elements of Geometry, with Notes, by J. R. Young, author of an Elementary Treatise on Algebra. Revised and corrected, with additions, by M. Floy, Jr., A. B. Philadelphia, Carey, Lea, & Blanchard.

The first eight books of these elements of geometry have lately issued fron the press of Messrs Carey, Lea, & Blanchard. They contain the geometry of lines. That of planes and solids is promised in part second.

The author has acquitted himself of the task before him in a masterly manner. None but the most rigorous methods of reasoning are employed. The author has omitted many of the theorems and lemmas of Euclid, which possessed no other value than that which arises from their forming a link in the chain of reasoning by which some geometrical truth of use in higher mathematics, is demonstrated. The promulgation and demonstration of useful geometrical truths have been his object, and wherever these could be arrived at by shorter methods than those of Euclid, either through his own invention, or by availing himself of the discoveries and inventions of recent geometers, it has been done in the most judicious manner. But this is not all, amidst the immense progress which science of every kind has made

in modern times, it is not to be expected that geometry has been stationary. The veneration for the great father of Geometry has checked, in England, the progress of free inquiry in this department. The labours of Simpson and of Playfair, have been restricted to annotations and modifications of single propositions. Mr. Young has taken a bolder course and has written an original treatise on the subject. Without disparaging the methods of Euclid he has only employed them when preferable to those of other writers.

In one particular, the discussion of the converse of propositions, he has outdone all his predecessors. His work more nearly resembles that of Legendre than any other we have seen. The first book is almost identical with Legendre. This is far from being a defect; it is no discredit to this book to bear so close a resemblance to that of "the first geometer in Europe." The fact that Mr. Young has been able to make improvements on M. Legendre's work, and in our opinion he has made them, speaks volumes in his favour. We have always been pleased with Legendre's Geometry—the beautiful simplicity which pervades it—the close connexion between the propositions—the immediate dependence of each on the one which precedes it—and the absence of all parade of useless theorems form its principal attractions. Some objections have been made to Legendre's work on the ground that it is not sufficiently rigorous. It is also said by Mr. Young to be defective in the theory of proportions; for ourselves we have never perceived this defect. The short but comprehensive enumeration made by Legendre of the changes, multiplications, evolutions, conversions, inversions, divisions, &c. that may be predicated of every proportion, has appeared to us sufficient. His applications of these abstract truths to geometrical proportion has to us seemed conclusive and sufficiently intelligible.

The other objection made to the work of M. Legendre, that of employing the method of superpositions, we conceive to be without sufficient foundation. We do not profess to understand the nice distinctions on which this objection is founded. We have never wished, for instance, for more convincing proof of the equality of two triangles, that have the two sides and included angle of the one, equal to the two sides and included angle of the other, each to each, than that which results from superpositions, by which it is shown that the two triangles coincide throughout and fill the same space. This seems to establish in the clearest manner their absolute identity. We have noticed these two objections to Legendre's work, because they are made the grounds of superiority claimed for Mr. Young's works. In our opinion its superiority must rest on other grounds. They are these, that while Mr. Young has retained all the excellencies for which Legendre's geometry was distinguished, he has added several improvements of his own, and with these has happily combined the most successful efforts of other modern geometers. Part second, on planes and solids will complete the elements of geometry; if these are executed with Mr. Young's usual skill, his work will form a valuable addition to the series already published in this country.

To say that the science of geometry was defective previously to the

publication of Mr. Young's work, would be to undervalue the labours of mathematicians of every age. To say that Mr. Young's is the only work in which all the theorems of linear geometry requisite for the study of the higher branches, are found, would be extravagant and unjust. Either of the editions of Euclid, Playfair's, or Simpson's, or Legendre's geometry, contains them all. If Mr. Young had written as good a work as M. Legendre's, it would have been enough, if he has surpassed Legendre, he has done more than could have been expected, and his work will be the more used for its intrinsic value, independent of that which it acquires from being the key to the best series of mathematical works ever published. X.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN FEBRUARY, 1833.

With Remarks and Exemplifications, by the Editor.

1. For an improvement in the mode of *Measuring and Transferring Liquids;* Thomas W. Whitley, Paterson, Essex county, New Jersey, February 1.

A vessel is to be made in the form of a bucket, and to have an opening in the centre of the bottom of it, with a tube descending from it, converting it into a funnel, exactly like those used by brewers for filling barrels. The opening in the bottom is to be covered by a valve; a lever intended to open this valve may be acted upon by a rod leading up to the top of the bucket, on the inside; when the valve is opened, the liquid which may have been poured into the vessel will run out. There are divisions, or graduations, within the bucket, to indicate the quantity of liquor poured into it.

The object in view, we are informed, is to transfer liquids from one vessel to another without waste, and without the filth usually attendant on such business. There is no claim, and therefore the whole machine is to be considered as patented. It may be a very valuable affair, but to us it does not appear in this character.

2. For *Fence Posts;* Harry Vail, Cortlandville, Cortland county, New York, February 1.

This is no wooden contrivance, although it appertains to fence posts. Pieces to form the bottoms of posts, in those situations where they are liable to decay, are to be made of cast iron, and driven into the ground, to form the foundation of the post. The pieces of iron are to be somewhat in the form of the blade of a spade, with a shank projecting up to the height of about nine inches. This shank may be an inch and a quarter in diameter at its lower, and three-quarters of an inch at its upper end. A hole bored into the lower end of the post, receives this shank.

For gate posts the iron is to be larger, and the lower part is to be furnished with wings, something like those of winged gudgeons.

We apprehend that in loose soils it would be necessary to make the blade much longer than that of a spade, or the fence would soon be prostrated.

There is no drawing accompanying the patent, and although it can be understood well enough without one, still as "the nature of the case admits of drawings," the terms of the law are not complied with.

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3. For a machine for *Cutting Sausage Meat;* Samuel L. Hoar, Salisbury, Lancaster county, Pennsylvania, February 1.

Four knives, standing out at right angles from a shaft, are to be made to revolve vertically by means of a band wheel. The meat to be cut is put into a hopper, or box, having an opening at one side, against which the blades of the knives rub, a facing of metal being placed around the opening. The meat, it is said, will require to be passed through about four times before it is sufficiently fine.

The knife blades are to be about six inches long.

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4. For a *Mangle;* called the American Mangle, or Domestic Callender; Isaac Doolittle, Bennington, Bennington county, Vermont, February 1.

This mangle has four cylinders, two of which stand near to each other, and in the same horizontal plane, their axes resting on the frame of the mangle. A third cylinder rests on these two, its periphery touching them both; this cylinder is to be turned by a crank; it is covered with cloth, and sustained in such a way as to allow it always to be in contact with the lower cylinders, adapting itself to the varying thickness of the clothes to be mangled, which are to be wound round it. Above this last cylinder is a fourth, the gudgeons of which run in a movable frame, whereby it is allowed to rise and fall. This is called the pressing cylinder, and it is to be brought down upon the middle cylinder by means of a treadle attached to a lever, to which the foot can apply sufficient force. The crank is to be constantly turned in the same direction, the reciprocating movement of the common mangle being thus avoided.

The claim is to "the general arrangement," which seems to be simple and good.

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5. For a *Reacting Water Wheel;* John Ambler, jr., Waterford, Saratoga county, New York, February 2.

This is a modification of the kind of reaction wheel for which several patents have of late been obtained. We do not see enough of novelty in it to make it necessary to give a particular description of it. If either of the patents previously taken, in which the general construction is claimed, are good, this cannot be so; if they are not good, there is nothing in this wheel to give it a decided, if any, superiority over them, so far, at least, as we can judge; this, however, may result from a want of clearness in the specification.

6. For a *Machine for Fleshing, Softening, and Working, Dry Hides;* Abner M'Millen, Bedford, Hillsborough county, New Hampshire, February 4.

This machine is to be substituted for the ordinary process of beaming; the hide to be beamed is to be carried between and around cylinders, by which the working of it is to be effected. It is first received between two fluted rollers, after passing which, it is to be acted upon by a cylinder that is made to revolve rapidly, and has on it four knives extending from end to end, and set spirally. The knives may be plain or scolloped, according to the nature of the work. The hide is drawn through by means of a cylinder around which it winds, this cylinder being furnished with a crank, to be turned by hand as the work proceeds. It is said that this machine will save one-half the labour usually required in beaming.

There is no claim made.

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7. For an *Apparatus to cure Smoky Chimnies;* David Bain, city of Baltimore, February 5.

A tube of a suitable diameter is to be fixed on the top of the chimney, and to rise to a convenient height above it. A cap, somewhat larger than the tube is fixed at a sufficient distance from it to allow the smoke to escape. Another short tube is then fixed around that first named, rising above the cap, and extending below the opening. The cap is to prevent the blowing of wind down the chimney, whilst the smoke may escape either upwards or downwards. The claim is to the foregoing apparatus.

This contrivance is so much like many others which have preceded it, that we know not where its novelty lies; and in point of utility we apprehend that it will not be found better than its predecessors. The cure of smoky chimnies, like that of some other diseases, requires that the remedy should be adapted to the constitution of the patient. There is no universal panacea.

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8. For a *Stationary Supply Water Tank;* William Kearney, and John M'Ardle, Brooklyn, King's county, New York, February 5.

This is an apparatus to pump water from wells, and to convey it for the supply of vessels at a wharf.

Two common lifting pumps are to descend into the well, the pistons of these pumps are attached to a horizontal beam, which is to be worked by a pendulum, a handle projecting from it for that purpose. Springs are shown in the drawing, which are to aid the pendulum, by pressing alternately on each end of the working beam. The water is to flow from the pumps into a large cistern, or tank, and from this cistern, or tank, a tube leads to the water side. A valve within the tank, closing the tube, is to be lifted by means of rods extending from the tank to the part where the supply is wanted, which rods have segments operating as bell cranks, and other mechanical appendages.

The claim is to "the before described method of conveying water to vessels."

Should we wish to convey water from a well to a vessel at some distance, we will take care to do so without interfering with "the before described method;" we shall, in particular, avoid the power of the pendulum, and of the springs, although we will certainly make a water tank if we like it. We will raise the water into it by two lifting pumps with a single beam; we will also convey the water from it along a tube, and at the end of this we will place an old fashioned cock, which we will open without a system of rods, segments, and levers, willingly leaving *them* to reward the patentees for their labours.

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9. For a *Machine for Boring and Mortising Stiles for Doors, Window Blinds, &c.;* David Hathaway, Troy, Renselaer county, New York, February 5.

A very elaborate description of this machine, or rather of these machines, is given, which concludes with the information that "all the improvements herein specified and described in the relative application and combination as above given to them, are considered by the undersigned as original in himself, and claimed by him as such." We consider, however, that the general arrangement of the mortising machine as here described, is no improvement upon some of those before patented, and that it is too much like them to be altogether original. The boring machine is unnecessarily complex, and is nowise better than many now in use; and as the patentee has not told us in what part of the apparatus he considers his improvements to reside, we shall not attempt any description of them, or of his machine generally.

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10. For a *Suction Hose for Fire Engines;* James Riley, Boston, Massachusetts, February 6.

After describing the construction of the common suction hose, which is made in pieces of about seven feet in length, and kept distended by copper ferules placed near together, an arrangement allowing of but little elasticity, and requiring much trouble in screwing the parts together, the patentee goes on to describe his improved suction hose, which is thus made:—

A leather hose is formed in the usual way, and over this is wound wire of a suitable size, running spirally from end to end. The wire is to be stitched to the leather, and the whole then covered with a varnish, formed by dissolving gum elastic in spirits of wine: a second tube of leather drawn over this completes the hose. We are told that thus constructed it will be elastic, may be made of any required length, and wound round some part of the engine when not in use.

The objections to the old plan will, in this supposed new mode, be succeeded by others, at least equally formidable. The coiled wire will soon break; in bending the hose, the wires on one side recede from, and on the opposite side approach each other, and will not resume their proper positions; when bent out of shape, the cylindrical form cannot be restored, and to such bending they are constantly liable.

These and other objections caused such hose to be abandoned after a full trial seventeen or eighteen years ago, in the fire engine manufactory of Mr. Jacob Perkins, now Merrick & Agnew's, Philadelphia. How many other abortions this scheme may have undergone we know not, that which we have noticed was, probably, not the first, and it is likely that the present will not be the last.

Notwithstanding the utter absence of novelty in the general plan, there is something entirely original in the varnish made by dissolving gum elastic in alcohol; if the patentee has a good recipe for doing this, we hereby bespeak a right to it, either for love or money.

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11. For an improvement in *Pumps*, intended to prevent the introduction of foreign substances into them; Frederick Kreig, Baltimore, Maryland, February 7.

We formerly noticed two patents for a similar object, which were obtained by a person of the name of Mettee, residing in Baltimore. The present is a very similar contrivance, intended to accomplish the same end by means nearly identical. The pump handle, where it passes through the pump tree, has a circular enlargement, working upon a pin in the usual way, and rendering a long slot unnecessary. The opening in the spout is made tortuous, to prevent the introduction of extraneous substances through that channel, and the cap is fastened down by a screw bolt. The things claimed consist of eight particulars, neither of which will give the slightest security to the patentee, as they are merely precise modes of making bolts, fixing parts together, &c., either of which could be just as well done in other ways.

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12. For a mode of *Framing, kneeing, and securing a Ship's or other Vessel's Deck;* John Bearce, Bristol, Lincoln county, Maine, February 7.

The mode of framing, and securing together the timbers of a vessel's deck adopted by the patentee, he denominates a *lock, dovetail, key purchase.* Beams extend across from side to side of the ship in the usual way, but instead of securing them to the sides by knees, *lock chocks* are employed for that purpose; these lock chocks are notched, by dovetail notches, into the beams, in the manner in which trussed girders are sometimes notched; or rather in the manner of joining timbers to bear a longitudinal strain. *Filling-in chocks*, in one or two thicknesses, are fastened to the vessel's side, between the beams, and are made with a shoulder to fay to the *lock chocks.* Keys are driven in, wedgingly, between *the lock chocks* and *filling-in chocks*, to make all firm. The bows are also strengthened by a breast hook, made up of timbers united in the manner of the *lock, dovetail*, purchase, and bolted together.

The foregoing description will furnish, to those acquainted with the subject, a general idea of the mode of procedure; and the drawing deposited in the patent office does no more; there, however, is a framed model which shows the plan perfectly, but this is not capable of being published in a book.

13. For a *Shifting Cooking Stove;* Henry Cressman, city of Philadelphia, February 7.

(See specification.)

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14. For a *Fireplace* for burning Anthracite Coal; William M. Russel, Boston, Massachusetts, February 8.

There are about this grate some things which are old and some which are new, but the patentee has not distinguished them from each other. The old parts consist in hollow jambs for heated air, air holes below the fire admitting air from without, and some other minor affairs. The construction of the grate, and the manner of hanging it, however, are, we believe, novelties. The ends of the grate are solid plates of cast iron, placed parallel to each other. There are bars both at the front and back, made precisely alike, as either may become the front. There are two movable bottoms, which are to be used alternately, in a way to be presently described. On the centre of each of the end plates, at the outside, there is a friction wheel, or roller, which also acts as a gudgeon, and on the jambs of the fireplace there are ledges upon which these rollers rest, and upon which they turn, allowing the grate to be drawn forward when required.

When the fire has been completely lighted, a register is opened which admits heated air to pass from the fireplace into another room. If there is any thing new in the mode of doing this, it is too obscurely described to make it known, and the drawing gives no representation of it, nor do we find any written references to the parts which are represented.

When the fire has gone out, or nearly so, fresh coal may be put into the grate, and charcoal upon it; the spare bottom is then to be placed and attached at top, the grate drawn forward and turned over, when what was the bottom is to be removed. The object of this is to prevent the necessity of raking out the coals to make a new fire. We think that one complaint is thus removed by introducing another which is equally, if not more, troublesome; the pulling out, and turning over, of the grate; the supplying a new bottom, and the getting rid of the old one, are each of them circumstances attended with trouble and inconvenience; all spare parts render such an affair objectionable in domestic economy, as they are not disposed of so easily as spare dollars, or kept in order with the certainty of fixtures.

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15. For an improvement in *Dogs for Saw Mills;* Martin Rich, Ithaca, Tompkins county, New York, February 8.

There are two half bales, with teeth to hold the log, in the usual form; there are two eyes, one on the end of the straight, and the other of the curved part of each half bale; these eyes are tapped and fitted to a screw bolt, one to each half bale, running longitudinally with the head block; when these screws are turned they serve to move and gauge the log, and in this the improvement consists.

16. For an improvement in the *Wash-board;* Stephen Rest, Manlius, Onondaga county, New York, February 9.

This wash-board is in the ordinary form of the fluted wash-boards, but the flutes are to be formed of tin, copper, sheet iron, or zinc, and the claim is to the use of these. We have never believed that a mere change of material, whilst the form of a machine remained essentially the same, could present a valid claim to a patent; if it can, some one may obtain another for using sheet brass, prince's metal, pewter, or other alloys, some of which are quite as cheap, and quite as good for the purpose, as copper.

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17. For a *Carriage Axle Tree;* Alexander Johnston, Essex county, New Jersey, February 9.

As we have already observed respecting another patent, so we say of this, the old and the new are blended together, the whole arrangement of the apparatus being given without sufficiently, if at all, distinguishing the parts improved. The end to be accomplished by this contrivance is the fixing a chamber for holding oil in such a way that it shall be supported by the axle, and not revolve with the wheel; and the conducting the oil from this chamber to the centre of the bearing of the axle. The cap of the wheel forms the oil chamber, and a hole is drilled in from the centre of the end of the axle, leading in a sloping direction to the side of it, near the middle of the bearing.

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18. For a *Regulator for Water Wheels,* Wind Mills, Steam Engines, *&c.*; Nathan Scholfield, Montville, New London county, Connecticut, February 11.

This is an ingenious, and, we think, a very good mode of dispensing with the ordinary *governor,* which consists of two balls attached to levers, that recede from each other by the centrifugal force with which they are whirled round, and operate upon a throttle valve, or mill gate, to regulate the supply of steam, or of water. Instead of these two balls, the present patentee employs a pendulum, in such a way as to obviate one considerable inconvenience resulting from the use of the balls. We would gladly give the specification of this invention at full length, but have not the drawings, which must be referred to in order to its being understood; we, however, will furnish such extracts from it as will serve to show the principle upon which the operation depends, although not the exact mode in which it is applied.

"The regulation by this instrument depends upon the action of a pendulum put in motion by a cam, whose revolutions continually carry it forward from its perpendicular or natural position, in one direction, and then leave it at liberty to fall back, causing it to perform continual vibrations. From the nature of the pendulum it is evident that gravity will cause it to descend or move, through similar parts of its oscillations in equal times at each succeeding vibration; therefore if the motion of the wheel is uniform, the vibrations of the pendulum will be uniform also, but if the motion of the wheel is slower, it will suffer the pendulum to traverse farther, but if the motion is quicker,

the pendulum will be checked sooner by the cam, consequently before it will have described so great an arc. The motion of the pendulum, therefore, indicates, or tests, the velocity of the wheel, or engine, during each vibration."

The construction of the "test latches," and other parts, through the medium of which the vibrations of the pendulum operate as a regulator, are fully described, and exhibited by drawings, and the circumstance upon which the superiority of this instrument is principally dependent, is thus noticed:—

"Theory and experience concur in teaching us that some wheels, such as large overshot, and breast wheels, and the like, and those operating a large quantity of machinery, require a considerable time to be affected by an addition or a diminution of water, in consequence of the time required for filling, or emptying them, and the inertia to be overcome, which, in some cases, is very great; so that regulators on the principle of flying balls, or those which are constantly acting while the motion is not right, will generally have carried the gate too high or too low, by the time the wheel will have attained its proper motion."

"The principal advantages possessed by this regulator over those in common use, operating on the principle of the flying balls, are, the moving the gate to a water wheel, or turning the valve of a steam engine, suddenly, any given quantity, and then waiting any required time for the effect, whereby they may be moved farther in any given time, without the danger of carrying them too far, as is the case with the other kind which moves the gate gradually until the motion is right, thereby requiring a much longer time, and generally carrying it too far."

"The pendulum regulator requires much less room than the other kind, and dispenses with a considerable gearing, and expense in attaching it to a gate, requiring nothing but a rack, and a pinion, and a cog wheel on one shaft."

"What I claim as my invention is the application of the pendulum on the principle herein described, and the arrangement and application of the different parts of the machine as a regulator for water wheels, steam engines, &c."

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19. For an improvement in the *Spindle, Flyer, and Bobbin, for Spinning, Twisting, or Doubling Cotton*, or other fibrous substances; Thomas Gadden, Saddle River, Bergen county, New Jersey, February 11.

In the arrangement of the spindle described by the patentee, the bobbin rests upon the top of a central pin which passes up and down through a dead spindle, there being a metal cap on the upper end of the bobbin, which resting upon the pin, creates the degree of friction which is necessary for the drag of the thread. The lower end of the central pin rests upon a traversing rod, or rail, by which it is raised and lowered, but is not allowed to turn round. The whirl of the

spindle is attached to a tube which revolves upon the dead spindle, the flyers being inverted, and joining the tube near to the whirl; in other respects the flyers are in the common form, excepting in having two eyes on each horn instead of one, placed, of course, one below the other.

The patentee claims "the obtaining of the drag at the top of the bobbin, by means of the plate or washer, as described, instead of the bobbin resting on the lifter rail, as is usual;" and says that when so constructed, the spindle will turn off more work, require less power to drive it, be more easily used, less expensive, and less liable to be out of repair than any other.

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20. For a *Back for Forges;* Frederick Avery, Hamilton, Madison county, New York, February 12.

This forge back is to be a cast iron box, similar to such as have been before described, but differing from them in having that part of the side in which the tuyere is fixed, cast in a separate piece, and attached in its place by screw rods and nuts; the detached plate is to be about the size of the portion usually acted upon by the fire. This is the part claimed as new. The forge back patented by Asa Graham, December 18th, 1832, has the whole front plate cast separate from the other parts, the object in view being exactly the same as that here proposed, namely, the renewal of that part subject to being burnt out.

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21. For an improvement in the *Form and Construction of Mill Stones;* James Preslow, Auburn, Cayuga county, New York, February 12.

The bed stone is to be in the usual form, but the upper stone or runner is to be faced in a manner differing from that generally practiced. For about two-fifths of the distance from the periphery to the centre it is to fit on to the bed stone, in the ordinary way, after which it is to be cut concave towards the eye, the space there between it and the lower stone being an inch or more. A portion, however, of this concave part is to be but about one-half the distance from the lower stone, which is allowed to the general surface of it. This concave part is intended to receive and break the grain preparatory to its being completely ground as it passes to the periphery. Three, or more, deep grooves, or channels, are to be cut into the concave part to admit air.

This mode of forming the face of the runner constitutes the principal claim of the patentee, who says that the grinding is thereby facilitated, and air admitted between the stones, preventing the immoderate heating of the flour.

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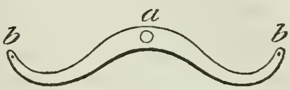
22. For a *Balance for Weighing;* Benjamin Morrison, Milton, Northumberland county, Pennsylvania, February 13.

The balance here described consists of a beam turning on a fulcrum in the usual way, but with the dishes to hold the weights, and the articles to be weighed, placed above the beam instead of being suspended below it, for which purpose the beam is bent in the way represented in the margin, where *a* is the fulcrum, and *b b* the ends of the beam. The scale dishes are each hung on two pivots, attached to cross bars fixed on the ends *b b* of the lever, the cross bars being so curved as to pass under the dishes. From the centre of each dish a rod descends to a considerable distance down, having a weight at its lower end to prevent the upsetting of the dish when articles to be weighed are placed within it.



The whole apparatus is described, but no claim is made to any part of it; we are left, therefore, to presume that the whole is considered as new by the patentee.

Balances, or scales, upon precisely the same principle with the foregoing, have been for some time in use in this country, but they are of English manufacture, and were, we believe, patented there. A large number of them was imported, probably two or three years ago, but they did not, at first, take, and were consequently sold at auction; since which, however, they have become diffused, and a number of them are in use in this city [Washington.] There is nothing new, therefore, in the foregoing plan, nor is the proposed arrangement of the parts equally compact and convenient with that of the imported article, although identical in principle.

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23. For *Machinery for Breaking and Softening Hides;* Stoning them in the Lime and Grainer; and Scouring and Setting Leather; Benjamin H. Aylworth, Masonville, Delaware county, New York, February 13.

A table is provided upon which the hide is to be laid; at one end of the table, posts are raised to sustain a shaft, having on it two or more cranks which, as the shaft revolves, work arms, carrying each of them a rubber and a roller, designed to operate upon the hide.

The shaft may be turned by any adequate power; the arms may be about six feet long, and have a lateral motion given to them by hand, whilst they are worked backward and forward by the cranks.

The arrangement of the machine appears to be extremely rude, and to be badly calculated for the proposed purpose; to us it is evident that the project is an untried one, and that the first attempt to operate with it will convince the patentee of its worthlessness, or lead him so to modify it as to render it useful. The drawing represents a rubber of stone or iron, on the extreme ends of the levers, and a roller about the middle of it, each of which is to act on the leather; but how they are both to be kept in contact with it, whilst the end of the lever attached to the crank is carried in a circle, thus raising and depressing it, as well as passing it backward and forward, we are unable to guess.

24. For an improvement in the manner of *Hanging and Securing the Rudders of Vessels;* Richard M. Taylor, city of New York, February 14.

There are seven separate claims made in the specification of this patent. 1st. "An universal joint, or hinge, for the hanging part of the rudder;" this consists of a hemispherical socket cast on the straps which are affixed to the stern post, and a hemispherical projection cast on the straps which secure this part of the hinge to the rudder. 2nd. "The eliptical form of the straps;" meaning thereby, that the straps of the hinge are not straight, but curved. 3d. "The several parts which sustain the rudder, and prevent its rising and unshipping." These consist, in part, of a cap and rings of a particular construction, represented in the drawings. 4th. "The elastic appendage to the after part of the rudder." This consists of cork, which by its elasticity is to prevent the effects of percussion upon the rudder. A similar appendage is applied to the bottom part "to act as a spring to facilitate its motion, reduce its superabundant weight, and operate as a repulsive power against any violent concussion from a blow upon these parts." Although the description relating to this and other parts is elaborate, it is not very clear; the model which is referred to would probably render it so, but as this makes no legal part of the description, we do not resort to it. 5th. "The appendages called the *guard*, which are secured to the wings of cork, and rudder, as will be seen by the model," &c. 6th. "The groove in the stern post, and the corresponding projection on the rudder." That is, the stern post is hollowed longitudinally, and into this fits a round, formed the whole length of the rudder, making a circular joint corresponding with the hanging of the rudder. 7th. "The manner of driving the main bolts through the rudder and stern post." These are to be driven in a diagonal direction, which, it is said, gives additional strength. Some of these claims, at least, are trifling in the extreme, such, for example, as "the eliptical form of the straps."

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25. For the *Application of Lithography to the Printing of Books, Pamphlets, &c.;* Robert Charles Manners, city of Boston, Massachusetts, February 15.

This invention the patentee denominates Typolithography. The mode of proceeding is to have a copy of the work to be transferred to stone, printed with the kind of ink adapted to that purpose, or with any kind of ink which will answer the intention. The patentee says that he does not claim to be the inventor of copying generally by lithography, "but to be the inventor of the application of lithography to the purpose of reprinting such printed works as aforesaid." This "invention of the application" appears to us rather equivocal, as there is no pretence made to novelty, excepting in applying the transferring to the printing of books. Now every one having any acquaintance with lithography, knows how to make such transfers, both from letter press, and copperplate printing; it has often been spoken of in publications on the subject, and some few months since

it was announced in the journals of the day, that a mode of transfering the common ink, even from old books, had been discovered in Europe, by means of which copies of them might be lithographically multiplied with great facility.

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26. For an improved *Stereotype Block;* Enoch Hale, Boston, Massachusetss, February 15.

This resembles so closely the first stereotype block which we recollect to have seen in use, that we really cannot tell the difference between them; they seeming to us to be much like some twins whom we have known, bearing so strong a likeness to each other, that it was necessary to see them together in order to distinguish them from each other. There are the usual two fixed clasps on one side of the block, and two movable ones on the other; two screws, the heads of which work against the plates of the fixed clasps, pass through the block and into tapped holes in the movable clasps. The heads of the screws may be formed into pinions, and turned by a suitable instrument; or they may be turned in any other convenient mode. "The invention consists only in the form, and manner of adjusting, the nuts."

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27. For an improvement in the *Flyers of the Common Spinning Wheel for Flax;* James Wilson, Monroe county, Kentucky, February 16.

This improvement consists in making the flyers of brass, or other metal, instead of wood; the metal to be about one-sixteenth of an inch in thickness, and half an inch in width. Instead of the wire hooks inserted in the wooden flyers, there are to be holes drilled through the metal, with a slot on one side to insert the thread. "The flyer made upon this plan runs lighter and steadier than any other kind known in the United States, and will last for ages." So says the patentee. We have seen brass flyers attached to a spinning wheel many years since; the wheel was made for the parlour, and finished in all its parts in parlour style. How many other flax wheels may have been made with metal flyers in or out of the United States, we cannot tell, but if we needed it, we should unhesitatingly apply this substance instead of wood, maugre the terrors of the patent law.

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28. For a *Cooking Stove for Wood or Coal;* Leopold Gotta, Huntingdon, Huntingdon county, Pennsylvania, February 18.

The merit of this stove, if merit it may be called, consists in the great number of its contrivances, intended to accommodate it to a great variety of purposes. The stove, as shown in the drawing, is round; the body of it, immediately above the fire, constitutes a boiler for containing water. A steam vessel for cooking meat stands with its lower part within the boiler, a steam pipe from which also enters its interior. Other steam chambers for vegetables, &c. may be similarly placed, each having pipes to discharge the redundant steam. For baking bread and cakes, there is an oven within a kind of drum

in the flue, surrounded by the heated air from the combustion. The stove is surmounted by a cover which encloses the steaming apparatus. This cover is to be raised from the stove by cords and pulleys when the viands are to be placed in, or removed from, the steamers. From this cover a general waste pipe ascends, to carry off the vapours arising from the steamers, and the articles contained in them.

The claim is to "the before described stove;" a claim which of course limits the patentee to the exact mode of arrangement given in the specification; this, we apprehend, is perfectly proper, as there is nothing new in it, excepting the particular mode of construction. The main objection to it appears to be its complexity, a circumstance which in the hands of ordinary servants destroys the usefulness of any apparatus, however good it may be in those of a person who is intelligent, careful, and interested.

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29. For a *Balance or Weigh Scales;* John Baptiste Maag, city of New York; an alien who has declared his intention to become a citizen of the United States. February 19.

This machine is the well know instrument for weighing wagons, &c. with their loads, and although there is a distinct claim made, we do not think that the main point which is relied upon is novel in its character. There are four levers under the platform, upon which it, with the load upon it, bears, their united action being on a fifth lever which leads to the rod operating on the scale beam; and the claim is to "the disposition and distribution of the whole weight equally upon the four lower levers, so as to unite their powers with the total weight," in a point on the fifth lever, "together with the construction, position, and combination of the lower levers."

The scale beam, or balance, has its fulcrum supported upon a rod which descends into a vertical post, and has teeth on one side of it, forming it into a rack, there being a pinion by which it can be lowered or raised, in the manner of many of the finer kind of scales. The rack is in the specification called a "serrated iron bar," and the crank and pinion are denominated the windlass and wheel; and the use of them is claimed as new.

We are not able to discover any thing in this apparatus rendering it superior, either in accuracy, convenience, or simplicity, to such weighing machines as are already in use.

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30. For *Constructing Evaporating Vessels, and purifying, and extracting Acids from, Sugar, Cane Juice, Beer, Cider, and Wine*; John C. Douglass, Cincinnati, Ohio, February 19.

The specifications of patents are, in the United States, public documents, and the making them such has been deemed necessary to the security of the community against those impositions which would be likely to result from the placing them under seal; it is the right of every citizen to obtain copies of them, and to carry them into court as evidence; it is also the duty of a public journalist faithfully and fearlessly to make known those facts which it is within the line

of his profession to publish; for ourselves, we have endeavoured to do this heretofore, and we shall continue to pursue the same course.

We have been induced to make the foregoing remarks in consequence of a request made by the above named patentee that his specification should not be exhibited so as to admit of any publication of it being made; so far as it was in the power of the office to comply with this request, it has been done; that is, the specification has not been voluntarily shown, but the editor has claimed his right, as a citizen, and examined it. It frequently happens that patentees have a good reason for wishing the publication of their patents delayed; as, for example, when they are taking measures to secure them in foreign countries, and in such cases we uniformly comply with their requests, and promise a future notice. In the present instance, however, there was no such intimation given, and as nearly six months have elapsed since the issuing of the patent, we can perceive no *good* reason for further delay.

After so long a preface it may be expected that our remarks upon the patent will also be prolix, and were we to make the specification our model, this would be the case, as, we believe, it contains from twenty to thirty pages of tolerably close writing, and refers throughout to accompanying drawings. We have done little more, however, than turn over the pages, and look at the claims, where, among several other things *equally novel*, we find the use of whiting for correcting acidity, and of charcoal for filtration. For saying no more upon the subject we have two reasons; in the fist place we have not discovered any thing to repay us for lengthened remarks, and in the second, we are just about to send our copy to the printer, who is waiting for it.

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31. For a *Balloon Calash, or Ladies' Hat Case;* Harriet B. Cook, Onondaga, county of Onondaga, New York, February 20.

The difference between this calash, and those used by our great grandmothers, and their female progeny in modern times, appears, so far as we can comprehend "the construction and operation of the said machine," to consist in a couple of stretchers, the ends of which are to be received by snaps, or catches, "which will form it into the balloon calash, or ladies' hat case, to wear over ladies' bonnets, to preserve them from injury by storms, or otherwise, when travelling."

As we expect shortly to take a journey in the public stage, we feel a little alarmed at this new appendage to the inflated habiliments of the ladies. To be jammed close, and kept warm, between two fine women, might serve to counterbalance many of the miseries of travelling; but to be placed behind two pair of Bishop's sleeves, with the addition of two balloon calashes, depriving one of seeing out of, or being seen within, the stage, is really appalling. In former times a gentleman might sometimes put his *coat sleeve* around the waist of a lady, to steady her in passing over rocks and ridges, but the envelops by which they are now fortified, are more effectual preventives of all contact, than would be the motto of *Nolle me tangere.*

32. For *Gum Elastic Shoes;* Nathaniel Ruggles, Bridgeport, Fairfield county, Connecticut, February 20.

An insole is to be laid upon a last furnished with an iron sole, and over this the gum elastic shoe is to be stretched. A welt is then to be laid round the edge and nailed through with nails having heads. To this welt the outer sole and heel are to be sowed in the usual manner.

The claim is to "the mode or process of attaching the outside sole and heel to gum elastic boots or shoes by means of a welt nailed as aforesaid: and in every respect in which the aforesaid mode or process may differ or vary from any or all other modes heretofore known."

A patent was obtained on the 21st of May, 1832, for attaching leather soles to gum elastic shoes, which is noticed at p. 391, vol. x. There was more brevity in the specification of the former patent, as well as in our notice of it, than in the present, but they both appear to be essentially of the same species, and as the one first described was also the first-born, it will appear to be the heir at law. The claim made in the present patent, to all things which may differ in the mode adopted by this patentee, from any heretofore known, is at least surplussage; it is his business, and duty, to tell what he patents, and he will not be aided by a notice that "man traps and steel guns are set in these grounds." The nailing of the welt, we suppose, is the principal thing relied on in the case before us.

The patentee declares that he made his "invention on the 2nd day of February, 1833, and reduced it to practice on the 5th day of the same month."

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33. For a *Check and Brace Bridle;* William F. Pendleton, King and Queen county, Virginia, February 20.

The great object of this check and brace bridle, is to cause a piece of metal to press against the under jaw of the horse, by means of a check rein constructed for the purpose. The bit is a stiff bit, in the common form, but it has a semicircular piece of iron attached to each end of it, and passing round under the jaw of the horse, giving to it a form something like that of a stirrup, the straight part of which would represent the bit. To the middle of the semicircle is attached a lever, the part which in a stirrup would be the eye for the strap, serving as its fulcrum. The lower part of the lever descends, and has the check rein attached to it, whilst the upper part, that ascends, has a curved plate of metal on it, which, when the check rein is tightened, presses forcibly against the jaw. There are thongs and rings attached to the saddle, and passing over the neck of the horse, to guide the check rein, and cause it to act upon the lever in a proper direction. The rein, check bit, and brace, it is said, enable the rider to keep the horse's head and neck in a proper position, as well as to stop him at pleasure. The claim is to the peculiar arrangement above described.

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34. For an improvement in the manner of *Hanging and using*

the Stones in Grist Mills; James M'Duffie, Bradford, Orange county, Vermont, February 21.

The spindle and driver are to be in one piece, the driver consisting of two arms extending out at right angles from the spindle; they are to be let into the runner, and made fast to it by melted metal, or by nuts and screws. A bridge tree is placed above the spindle, which being forced down by screws serves to keep a light and small stone from rising.

There is no claim made, nor is there any thing new in fixing the spindle firmly to the runner, yet upon this, if upon any thing, the patentee appears to depend.

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35. For an *Improvement in the Quadrant*, patented by Phineas Spear, on the 19th of March, 1830. Francis G. Clarke, Portland, Cumberland county, Maine, February 21.

Without a drawing, it would not be possible to give a clear description of the arrangement upon which the proposed improvements depend. The patentee states that this instrument is distinguished from Spear's quadrant, by employing a semicircle and weights instead of a spirit level, to determine the position of the quadrant, or sextant; by the number and position of the lines; by the arch and index; and by the spring and principle of adjustment. The "design of the whole apparatus is to enable the navigator to ascertain his latitude when the horizon is obscured by fog, or by any intervening object, either from the meridian altitude of a celestial body, or by double altitude; and also to obtain the altitude of the sun in order to ascertain the longitude by chronometers, when the horizon cannot be seen."

We apprehend that however applicable instruments to be adjusted by a spirit level, or by a hanging weight, may be on shore, the practical difficulties in the way of using them on ship board will still be such as to prevent the employment of them there, from their not admitting of that accuracy which is so essential to security.

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36. For a *Composition for Drying Oil Paints;* Nathan Hemenway, West Springfield, Hampden county, Massachusetts, February 22.

The composition is formed by taking umber, sugar of lead, white vitriol, and litharge, of each one pound, and adding thereto two pounds of white lead, and half a pound of shellac, red lead, and blue vitriol.

The *acids* of these materials are to be extracted by heat, for which a furnace may be used, having a bottom and sides of brick, and a top of sheet iron. The oils are to be used without boiling.

The foregoing contains all the information given; this, however, is not much to be regretted, as the whole thing is altogether ridiculous. The patentee has certainly made a fine assemblage of dryers, with the exception of the shellac, which in his composition will be something like "chips in porridge." About the *acids* that are to be ex-

pelled there is some mystery, which the brick furnace, with its iron cover, does not enable us to explain

37. For an improvement in the *Spinning Mule*, called the "Improved Mule Head;" Henry Hopkins, Providence, Rhode Island, February 22.

The improvement here patented is designed, among other advantages, to obviate the inconveniences which result, in the common mule, from the throwing the mandorer wheel out of gear at every stretch of drawing out the carriage, and especially the waste of yarn and loss of time not unfrequently produced from the wheels not at once entering into gear on the return of the carriage. By the application of an engaging and disengaging apparatus called the "ratchet wheel and dog" to the mandorer shaft, all the wheels connected with the operation of drawing the carriage out, are constantly kept in gear.

In the ordinary mule it becomes necessary to throw the mandorer wheel into gear by hand, in order to shorten the stretch of the yarn, as the cops become formed; an operation requiring considerable skill, and continued attention. Under the present arrangement nothing is more necessary than to shorten the distance to which the carriage is drawn out, the operation of engaging and disengaging being self-acting and certain.

In the drawings in the patent office the arrangement of the machinery is clearly shown, and is manifestly well managed.

38. For an apparatus called a *Steam Generator and Refiner;* John L. Hinkle, Hanover, York county, Pennsylvania, February 23.

This "generator and refiner" of steam, may, it appears, be applied to kettles and boilers of various descriptions, but is peculiarly applicable in the art and mystery of distilling ardent spirits, in which its merits are so great that, according to the patentee, it has "power to increase and refine the steam in kettles for distilling spirituous liquors; it will reduce the fiery flavour; refine and mellow the liquor, as if it had age; save fuel, and produce more spirits from the same mass, and that in less time than by the present mode of proceeding."

Besides all the foregoing advantages, we are informed that although the steam is more rapidly generated, it will have less tendency to burst the boilers, the generation being effected at a reduced temperature. It generally happens that in great inventions we are as much surprised at the simplicity of the means employed, as we are gratified by the utility of the effect produced, and should the patentee not have deceived himself in the present instance, his invention will serve to confirm this sentiment. If so, however, there must be something more in it than meets the eye, something occult, or at least so recondite, that to discover it demands more knowledge, and better optics than we possess; although the mode in which his apparatus is to produce such effects may be inscrutable, its construction, however,

is so simple, that of this we can give a perfect idea without the assistance of a drawing, and thus enable each of our readers to form his own judgment of the thing, which may be attended with the further advantage of inducing some of them to throw light upon the subject.

Supposing the *generator and refiner* to be applied in a still, it is to consist of three concentric tubes, one placed within the other, open at both ends, and leaving a space between each; the following dimensions are given in the specification as an example of what may be their sizes. In a still kettle twenty-eight inches in height from the bottom to the top of the neck, and there fourteen inches wide, the outer tube may be ten inches in diameter, and twenty-one long; the second tube, seven inches by twenty-three, and the inner one four inches by twenty-five. These are to be so connected as to be concentric, and to stand vertically in the still, having feet which keep them an inch from the bottom. The tubes may be made either of metal or of wood, so that, it seems, their being good conductors of heat is not necessary to the exercise of their generating and refining powers.

Similar tubes are to be laid longitudinally in horizontal cylindrical steam engine boilers, or the tubes may be varied in their forms, to suit the purpose to which they are applied.

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39. For an *Inclined Water Wheel;* James Wood, La Grange, Fayette county, Tennessee, February 26.

The placing of buckets on the periphery of an inclined wheel, for the purpose of taking advantage of small falls of water, has been repeatedly proposed, and sometimes patented; but such wheels, we believe, have never been continued in use. The present plan is intended as an improvement upon those which have preceded it, but we predict that the same fate which has befallen them, will, at an early period, arrest the progress of this wheel.

The buckets which are to receive the water from a spout, consist of separate boxes placed round the wheel, close to its periphery; these boxes are hung on pivots, or gudgeons, near the middle of their bottoms, and as they receive the water on the descending side, the boxes are kept in their places; when, however, they pass the lowest point, and begin to ascend, the water flowing towards the opposite end of the box, cants it upon the pivots, and the water flows out: by means of a roller underneath, acting as a cam, the boxes are returned to the proper position for receiving the water, previously to their again passing under the trough. The claim is to the construction of the wheel, and particularly to the manner of forming the buckets to turn on centres.

It will be readily seen that the power which is to cant the buckets being the gravity of the contained water, it must ascend to a sensible height on the inclined wheel, before it will be discharged, and that there must necessarily be a proportionate loss of power. This, however, is not the only objection which may be urged against the present contrivance; but as we think that its defects will be obvious to the experienced mechanist, we deem it unnecessary to say more.

40. For *Improvements in the Double Napier Printing Machine;* Sereno Newton, city of New York, February 26.

Without the use of engravings, we cannot show the manner in which the patentee has constructed those parts of the double Napier printing machine, which constitute his improvements; they, however, have been fairly tested, and are approved. One of the improvements consists in the application of grippers, in the manner described, for the purpose of seizing the paper, and carrying it forward to receive the impression, in "a printing machine the cylinders of which make three revolutions to one impression." The apparatus which acts upon the grippers is withdrawn, laterally, during two revolutions of the cylinder, but it may also be applied to printing machines the cylinders of which make but two revolutions to each impression, and this application of it is also claimed. Another of the improvements consists in a mode of *perfecting* the sheets, or making register, in book work. The points which pass through the sheets are withdrawn, at the proper time, by the action of an eccentric attached to the end of the arbor which supports the grippers, and this particular arrangement is claimed in its application both to the double and single cylinder printing machine.

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41. For an improved *Double Cylinder Register Printing Press;* Sereno Newton, city of New York, February 26.

Among the most celebrated of the printing presses which have been invented in England, and which have facilitated the business of printing to an extent which is truly astonishing, those of Mr. Napier, and of Cowper, and Applegarth, stand conspicuous. The improvement for which Mr. Newton has obtained the present patent, is for a modification and combination of certain parts of each of these presses. In England this could not have been done, the separate parts belonging to the respective patentees; the combination made by Mr. Newton, if it had been thought of there, would have required the concurrent consent of each of the parties. What is now claimed as new is the "combining that part of the Napier printing machine which constitutes the bed, and its appendages, with the cylinders, and such other parts of the superstructure of the Cowper and Applegarth's printing press as are employed in the receiving and conveying of the sheets."

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42. For *Machinery for Sawing, Moulding, and Polishing Marble and other Stone;* Isaac D. Kirk, city of Philadelphia, February 26.

The marble to be sawed is placed upon a frame, or carriage, which is to slide on horizontal, or inclined ways, and is to be drawn on by a weight over a pulley, or otherwise. The saw is to work vertically, like a saw mill saw, and is to be made of copper or other metal. Sand and water are to drop from a hopper on to the kerf. So much for the sawing part, and respecting the moulding and polishing, we hear but little, all that is said being "For moulding the same principle as for sawing; for polishing I have the buffs placed in the place of the saw." There is no claim made, and the whole description is

meagre, crude, and undigested. All we have learnt of the mode of sawing is derived from the drawing, but this throws no light upon the other processes mentioned.

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43. For an improvement in the mode of constructing a *Back for a Forge;* patented December 15, 1832. Patent surrendered, cancelled, and reissued, February 26, 1833. Asa Graham, Hamilton, Madison, county, New York.

We refer the reader to our notice of the former patent for the description of this forge back, it being precisely for the same thing; namely, the casting the front plate, which forms the forge back, in a piece separate from the sides, to admit of its renewal, and to prevent its acting injuriously by its expansion, on the other parts of the box. The examination which we have made of the new specification has not shown us the reason for the surrender and cancelling of the former; perhaps, however, a critical comparison of the two might have furnished an explanation, but the question is of little importance to any one but the patentee.

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44. For a *Forcing and Suction Pump for Fire Engines, &c.* John F. Rodgers, Waterford, Saratoga county, New York, February 27.

The chamber of this pump, or engine, is a cylindrical drum, placed so that its axis shall stand horizontally. The length of the cylinder, internally, may be six, and its diameter fourteen, inches. It has double heads at each end, allowing a water way between them. The cylinder is truncated or cut off, above and below, forming flat valve seats; it is also divided into two chambers by vertical partitions extending from the shaft in the centre, to the middle of the valve seats. The pistons consist of two wings, attached to the shaft which passes through stuffing boxes in the heads. The levers are worked like those of the ordinary fire engine, causing the valves to vibrate in the cylindrical cavity. The valves and the water ways are so arranged as to cause each of the semicylindrical cavities to operate as a double pump, the water flowing in on one side of each piston, whilst it is forced out into an air vessel on the other. On to the lower part a suction hose is to be fixed, and when this is unscrewed it opens a passage into the interior of the chamber, through which the hand may be admitted, should it be required for any purpose, such as adjusting or cleaning.

The claim is to "the piston with its form and principles of double action, by which each wing compresses water at one and the same time, with equal force; together with the lateral passages provided for it to pass through the cylinder into the air barrel. And also the method of attaching the hose or suction pipe to the engine, with the opening provided for examining, and warming, or drying, the inside of the pump."

This pump is a mere variation of Rowntree's fire engine pump, but is inferior to it, in having two pistons instead of one, which in Rowntree's produces the whole effect of the two, whilst the arrangement of

the water ways, in that pump is such as to offer less obstruction to its passage, its direct course being less changed. The valves in Rowntree's may also be more readily come at than in the one now patented. Rowntree's pump is described in Nicholson's Operative Mechanic; in the various Encyclopedias, and in nearly all the modern works which treat upon the subject of hydraulics.

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45. For an *Edge Rail and Chair for Rail-roads;* William B. Mitchell, city of Philadelphia, February 27.

(The specification will appear in the next number.)

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46. For a *Machine for Breaking Clay for Brick*; Nathaniel Boynton, Danville, Caledonia county, Vermont, February 27.

This is the common pug mill used in potteries from time immemorial. It consists of a cylindrical vessel standing vertically with a shaft made to revolve in it, carrying knives, the blades of which stand obliquely, passing between stationary knives fixed on the inside of the cylinder. All claim has been omitted, and, as we think, very properly.

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47. For a *Machine for Hulling and Cleaning Clover;* Thomas Gollogher, Fairfield county, Ohio, February 28.

This machine consists of a fluted cylinder and concave for rubbing the seed, which is fed to them by a hopper; it has also a wind wheel and two sieves, all of which are very much like a great many others; the patentee, however, has found many things to claim, as will be seen by the following declaration.

"I claim as my own invention in the above described machine, its outward and internal construction; the feeder, cylinder, concave, and wind board. I also claim to have improved the fan and shaking apparatus so as to conduce to the operation of the machine. And I claim as my own invention the result of the united operation of the whole machine."

This is certainly claiming both by wholesale and retail, as regards the construction of the apparatus, besides which we have a novel claim in the result of the whole machinery, which result is the rendering of clover seed clean from the hulls. As to the improvements in the shaking apparatus, and the wind board, we find them in the claims only, nothing respecting them appearing either in the specification or the drawing.

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48. For an improvement in the *Saw Mill;* Henry Gordon, Liberty, Adams county, Pennsylvania, February 28.

The saw frame instead of working between fender posts is to be suspended by vibrating arms, four above and four below, one half of them attached to the back, and the other to the sides of the frame. These must have segments of circles at one of the ends of each bar, or at least to those at the sides of the frame, or they must be attached to a second vibrating bar; the mode of attachment, however, is de-

scribed in very general terms. The log is to be drawn back by the weight of a bucket to be filled with water, and tilted when it has descended. Some other novelties are mentioned, but none of them appear to be worthy of particular notice. The hanging of saw frames upon vibrating bars, in different ways has been patented more than once; it, however, does not appear to offer any advantage over well constructed slides, or fender posts.

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49. For a *Machine for Making Cooper's Rivets;* Timothy Allen, Plymouth, Plymouth county, Massachusetts, February 28.

This is a machine for cutting off the wires, or rods, into proper lengths for a rivet, and impressing the heads upon them by suitable dies. The operation of the machine is not rendered clear by the description and drawing, but it manifestly resembles, in several particulars, other machines for heading rivets and screws; there possibly may be some novelties of arrangement sufficient to entitle this to the character of a new machine, but, if so, they are not made plain. The claims are to "the conveyance by the punch, and holding the rod whilst headed by the punch. The solid cast iron die is applied to making rivets by one operation."

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50. For a *Machine for Thrashing Grain, Shelling Corn, and Breaking and Dressing Flax and Hemp;* Wrestcum P. Barton, Batavia, Genesee county, New York, February 28.

This is the common cylinder thrashing machine, having beaters, and a concave; when used for hemp or flax it is said that "the flutes and notches on the prominent edges of the concave may be dispensed with;" we apprehend that for these purposes it would be best to dispense with the whole machine. How it is to be employed for shelling corn, is left to the judgment of the operator.

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51. For an improvement in the *Mode of Building Dams;* Samuel J. Burr, Chambersburg, Franklin county, Pennsylvania, February 28.

This dam is to be curved up the stream, or is to be in the form of an arch laid on its side, the two banks of the stream forming the abutments of the arch. The water is not to be allowed to fall perpendicularly over the edge of the dam, but it is to be so banked, or built, as to form an inclined plane. The great point insisted on, however, and that for which the patent is taken, is the giving strength to the dam by its arched form.

How much novelty there is in this plan may be judged of from the subjoined quotation from Oliver Evans' Millwright's Guide, published about forty years ago. Speaking of dams, he says, build them "so that the pressure or force of the current, will press their parts more closely together."

"If the dam is built of stone make it in the form of an arch or semicircle standing up stream, and endeavour to fix strong abutments on each side, to support the arch; in the laying the stone put the

widest end up stream, and the more they are forced down, the tighter they will be pressed together."

52. For an *Edging Iron, or Grooving Roller, for Grooving Tin Plates,* and other sheet metal; Charles Fisher, York, York county, Pennsylvania, February 28.

Two rollers are to turn in a frame, like flatting mill rollers. They may be made wholly of iron, or with the exception of the grooving part, wholly of wood. Along one of the rollers a groove is made of about one-eighth of an inch in width, and three-eighths in depth. The groove does not point to the centre, but is like a kerf along the roller, which would be made by a saw intended to cut off a thin segment of the roller.

The claim is to "the exclusive right of an edging iron, or grooving roller, in which the tin plate, sheet iron, sheathing copper, &c. is put, and the edge turned, in one or two operations, from one extremity of the tin, iron, copper, &c. to the other; and also the right to the use of the rollers for edging."

Various grooving irons have been made, and are extensively used for the above purpose; no general claim, therefore, to such an instrument can be valid, although the particular construction of a machine differing from the others would be a good subject for a patent.

53. For a *Machine for Shaving Leather;* James Reilly, Waynesborough, Franklin county, Pennsylvania, February 28.

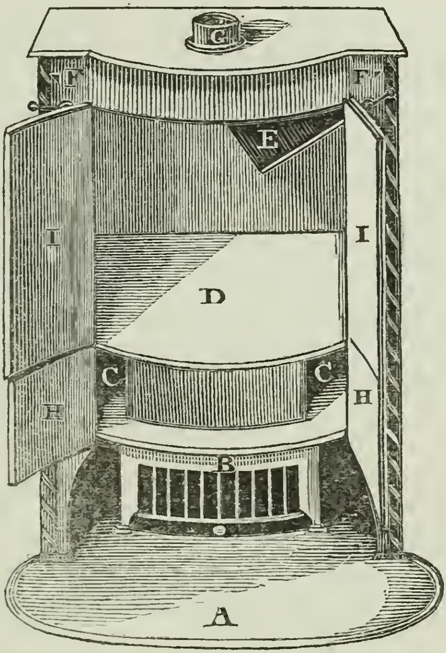
The leather to be shaved is drawn along, by the turning of a roller, between a knife, and a plate of iron, which may be so raised or lowered as to regulate the thickness. There is also a contrivance for shaving the leather tapering, by turning a roller, hung eccentrically, under the iron plate before named, which raises the plate as the leather proceeds. There is a general claim to the machine which can hardly be sustained, machines for the same purpose having been heretofore made, in a similar way. The apparatus for cutting the leather tapering, for covering whips, and other purposes, is probably new, and would, therefore, have been the proper subject of a special claim.

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a patent for a "Shifting Cooking Stove." Granted to HENRY CRESSMAN, *city of Philadelphia, February,* 1833.

To all whom it may concern, be it known that I, Henry Cressman, of the city of Philadelphia, and state of Pennsylvania, have invented an improvement in the stove intended, principally, for cooking with anthracite coal, which I denominate the shifting cooking stove, and that the following is a full and exact description thereof.

In the construction of the grate for holding the fuel, there is nothing peculiar. It is sustained upon the bottom plate of the stove, which I generally make with a lap, resembling that of the common Franklin stove, which I usually perforate to allow the ashes to fall into a drawer below the plate; this admits of the placing the grate lower than it could otherwise be placed, and renders it the more convenient. A, in the accompanying drawing, represents the bottom plate, and B the grate. The upper part of the grate passes through a plate C C, into which it is fitted. The front containing the bars, and the back and end plates, may be made in separate pieces of cast iron, and the back and ends may be lined with fire brick, if preferred.



At a convenient height above the plate C C, is placed another plate D. A height of four or five inches will allow of sufficient room for supplying the grate with fuel. The grate is surmounted by an oven of which the last described plate forms the bottom, when the stove is used for cooking. The plate C extends to the side and back plates of the oven; but the plate D does not touch the side plates by two or three inches, or such distance as may be thought requisite for the flues which are to ascend on each side of the oven. The plate D is hinged, or works upon pins, on its back edge, so that it may be turned up against the back plate of the oven, when not required for cooking; it may also be so fixed that it can be lifted out altogether. This plate,

by its turning back, or removal, constitutes one of the shifting parts of the stove.

The inner side plates, between which and the end plates of the stove are the spaces for flues, are also made to shift, so that when the plate, D, is turned back, and these side plates are removed out of the way, the space which before constituted the oven, forms merely an open chamber above the grate. These inner side plates, I divide on each side into two; the lower division falling into ledges prepared for them, and passing a little below the ends of the plate D, and extending up to about one-half of the height of the oven. The upper divisions are hung upon joints, so that they may be turned up against the top plate of the oven. One of these is shown in the act of being turned up, at E. The cranks, or handles, F F, serve to shift these parts, and are provided with catches which latch them in their places. When they are down, the flues on each side are complete, and the heated air is compelled to pass within them. When up, the heated air is diffused through the whole space of the oven, which will rarely be found objectionable in cooking, but they may be removed and replaced instantaneously.

The top of the stove is formed of two plates, to conduct the heated air to the pipe G.

Provision is made in, or on, the inner plates to put bars across the oven to rest dishes on, so that whilst some articles are being cooked on the shelf D, others may be placed on these bars, and form tiers above them. Cooking, &c. may be performed upon these, over the open fire, when the plate D is thrown back.

The folding doors which enclose the stove I divide into two parts H H, and I I; the lower parts serving to enclose the space between the grate and the oven, and the upper parts enclosing the oven proper. The lower doors serve also to regulate the heat, accordingly as they are opened or closed.

In the use of this stove there are various arrangements which will be found useful, and which experience will suggest. The following will often be found convenient. The lower side plates may be taken out, and the plate D, lifted up and laid on the ledges in which the lower inner end plate slides, when by turning down the upper end plates, a smaller oven will be formed, and more space allowed above the open fire, for cooking in other ways.

This stove may be altered in its form, and in the particular arrangement of its parts, whilst those features which constitute the difference between it and other stoves for cooking and for heating apartments, are still retained. It is these alone which I claim as my invention, and for which I ask a patent. They consist of the shelf D, and the inner shifting plates of the side flues, by which this stove may be converted into a simple open stove, or have an oven formed in it, at pleasure, whether the same be effected in the exact way which I have indicated, or in any other operating upon the same principle, and producing similar results.

HENRY CRESSMAN.

ENGLISH PATENTS.

To Frederick William Isaac, *ivory, tortoise-sheel, and pe.rl worker, for his having invented certain improvements in ornamenting the finger keys, and other parts of piano-fortes, organs, and other musical instruments. Sealed June* 28, 1832.

The above invention of improvements in ornamenting the finger keys of piano-fortes, organs, and other musical instruments, is described by the patentee to consist in new and improved modes of covering those parts of them, which are usually either veneered with ivory, or made of ebony, with pearl, tortoise-shell, turtle-shell, or other fit and proper, rich and beautiful materials, so as not only to add greatly to their splendid and elegant appearance, but also, from the superior hardness, glossiness, or high polish of their surfaces, to facilitate the rapidity of the fingering in the performance of quick and brilliant passages in musical compositions.

In covering the finger keys with pearl, the patentee employs the following improved method, which is described in the specification in the following manner:—

" Instead of merely cementing flat plates, or lamina, of pearl to the wooden parts of the keys, by means of glue, as usual, I compose a superior cement in the following manner: to a solution of the best Salisbury or other English glue made in a leaden glue pot, with fresh ale, of a proper consistency, I add a small quantity of isinglass which has been previously dissolved in a mixture of ale, and of ascetic acid or vinegar, by a gentle heat, and also a little boiled linseed oil; and when the whole have been thoroughly incorporated by stirring them together at a simmering heat, I add a sufficient quantity of the fine German carbonate of lead, called 'Khrem's White' in commerce, or the finest plaster of Paris, finely powdered and sifted, to give to the cement a uniform white colour. The intent of these additions to the solution of glue being to give it the power of resisting the atmospheric changes of heat and cold, and moisture and dryness, and also to suit it to the white colour of the pearl, and therefore these said additions must be varied in their proportions accordingly, and agreeably to the different qualities of the said component materials.

" In addition to this superior cement, and especially to guard against the ill effects of hot climates, I introduce between the lamina of pearl and the wooden part of the keys, a slip of cloth, such for instance, as hempen, linen, or cotton shirting, or of woven silk, or the fine woollen fabrics, known as cashmeres or merinos, or cloths of any other materials, and of about the same thickness as the above; or instead of cloth, slips of vellum, or parchment, may be also used with advantage, the intent being to counteract the great tendency of glue to shrink and contract in drying, and thereby cracking and loosening by the introduction of the above, or similar, partially elastic and yielding materials.

"I fill the pores or interstices of the said cloth with the above

composition, or improved cement, by laying it upon the wooden part of the finger key, and by repeatedly striking the brush, or Dutch painter's tool filled therewith, upon the surface of the said cloth, until it is completely saturated therewith, and the cement passes through, and effectually binds the cloth to the wood, when they are to remain till they become perfectly dry. I then coat the surfaces of the cloth and of the pearl, with the cement, in a similar manner as when the common glue is used, and laying them together in their place, I employ the heated caul in the ordinary manner of veneering, to press the parts together, and to expel the extra quantity of cement which would otherwise remain.

"In using vellum or parchment instead of cloth, I merely brush it over with cement, instead of striking the brush upon it in the manner above described.

"When the cement is become hard, the pearl is to be cleaned off, and prepared for polishing in the German manner; first, with pumice stone, powder and water, and then with rotten stone, powder and sulphuric acid, applied upon a soft woollen cloth, with which the pearl must be rubbed until a beautiful polish is obtained. I can also employ the above cement and cloth, vellum or parchment, in veneering the finger keys with ivory, and with similar advantages.

"In veneering the short finger keys with tortoise-shell or turtle-shell, I employ a similar cement to that before described, only that it is coloured yellow, green, maroon, red, black, or of any other colour required, by using properly ground and sifted colours accordingly; I likewise have the cloth dyed of similar colours, and cement it upon the wooden parts of the keys, in the manner above mentioned. I then apply the tortoise-shell or turtle-shell with the cement, in the usual manner of veneering with tortoise-shell; and, lastly, polish it also in the usual way."

In order, however, to facilitate the process of veneering the short finger keys with tortoise-shell or turtle-shell, as well as also to render it more durable, and instead of laying the shell upon the wood in several parts or pieces as usual, the patentee forms the shell into a solid cap or coat, in the shape of the key by means of male and female dies employed in a screw press of the common construction, and immersed in boiling salt water.

The boiler described in the specification to be used for this purpose is a square cast iron or other metallic box open at the top, and placed over a small furnace or German stove. The press and shaping dies, with the tortoise or turtle-shell to be operated upon, are placed within this boiler, and submitted to the action of boiling salt water. On the top of the press there are two projecting pieces, or stretchers, to steady the press in the boiler, and on the sides of the boiler are formed guides to steady the bottom plate of the press within the boiler.

The pair of dies employed for this purpose are of the required shape, to form two coverings or veneers for the short finger keys at one time; the lower die containing the recess is placed upon the bottom plate of the press, and the upper one is moved up and down the press of the screw between guides in the usual manner.

The projecting part of one die is made to fit the hollowed part of the other die, in such a manner as to allow of a sufficient thickness of tortoise or turtle-shell to lie between them when compressed by the action of the screw of the press (which is turned by a lever projecting over the top of the boiler,) so as to form two caps or coats in length at one pressing, which may be afterwards cut into two parts, or coverings, for the short finger keys.

Having described the methods of ornamenting the finger keys of musical instruments, the patentee proceeds to describe the other parts, to which these improvements are applicable, and proposes to ornament "the name boards, the key slips, the cheek pieces, and the candle boards; all these may also be advantageously veneered with tortoise or turtle-shell, or with buhl, at discretion, by employing the above mentioned improved cements, and introducing the cloth, vellum, or parchment in either of the before mentioned methods; and further states, in conclusion, I can likewise greatly improve the art of veneering the cabinet, or wood parts, of musical instruments with common glue, by introducing a bed of linen, hempen, or cotton sheeting, in the above manner. I do not mean or intend hereby to claim as my invention any of the various means or methods herein mentioned which may already have been known or in use; but I do hereby claim the introduction of the woven fabrics, or cloths, or vellum, or parchment, in order to afford a degree of elasticity to the glued or cemented veneers; and I likewise claim the formation of the tortoise-shell and turtle-shell caps or coats for the short finger keys, in one solid piece, by means of the screw press and dies, instead of veneering them with separate pieces." [*Lond. Jour.*

For improvements on the Steam Engine, and in the application of steam power to navigation, and to locomotion. RICHARD TREVITHICK. *March* 19, 1833.

In the "Repertory of Patent Inventions" for May last, the specification of this patent, with drawings, is given at length; a clear idea of the proposed improvements, however, may be obtained from the statement of the things claimed by the patentee, which we give in his own words.

"Now whereas I claim as my invention, firstly, the interposing between the boiler and the working cylinder of the steam engine, a long, many-curved, heated pipe, through which the steam is forced to pass with great rapidity, without being permitted to come into direct contact with water, by which arrangement the steam is made to absorb additional heat, and, at the same time, allowed to expand itself into a greater volume. Secondly, placing the working cylinder of the engine within such part of the flue or chimney as shall insure the

cylinder to be kept hotter than the steam used in it, by which means the expanding of the steam is still further promoted. Thirdly, propelling a navigable vessel by the force of the recoil, produced from water received, with a moderate degree of velocity, into a receptacle near within the stern, in the direction of the course of the vessel, and ejected with great velocity in a direction opposite to that course, the velocity of the jet being at least double the required speed of the vessel to be propelled, provided always that the same be effected in the manner heretofore described. Fourthly, applying a boiler combined with a steam expanding apparatus, as before described, instead of a boiler alone, to a locomotive engine, whereby the power of the steam is applied after the steam has undergone the expanding process; and whereby a diminution is effected in the weight of the boiler, and in the weight and consumption of water and of fuel."

Remarks by the Editor.

Although the name of Trevithick is one which has attained much just and honourable notoriety in the history of the improvements made in the steam engine, we are apprehensive that the points claimed as new, and relied upon as useful, in the patent above alluded to, will not, upon a fair examination, stand the test of investigation in either particular.

The application of heat to steam after it has been generated in the boiler, has been frequently made, both in England, and in this country. It has been sometimes done by passing flues through the steam chamber, in the upper part of the boiler, and at other times by heating the pipe by which the steam is conveyed from the boiler to the cylinder; so far, however, as we have learned the results, they have been such as to disappoint the anticipations of those who have made the essay; for although by an increase of temperature the elastic force of steam must necessarily be increased, the ratio is such that the advantage gained is but small in amount. We cannot now give the time and space required for a disquisition on this point, nor do we deem it necessary to those acquainted with the subject, as, to such, we should have but little to offer which could be considered as new. The density of steam is an important element in its mechanical effect, and although by heating it after it has been generated, what has been denominated *surcharged steam*, is produced, its density is not thereby increased, this requiring more water as well as more heat.

As regards the mode of propelling a vessel "by the force of the recoil produced from water received with a moderate degree of velocity in the direction of the course of the vessel, and ejected with great velocity in a direction opposite to that course," we had scarcely imagined that a thing which had so repeatedly been essayed, and as frequently proved an abortion, would now be proposed by any one out of his novitiate, especially since the publication of the experiments which prove that water experiences no sensible resistance in its discharge from an orifice submersed in the same fluid.

Patent granted to DANIEL HORTON *and* GEORGE HORTON, *Iron Masters, for an improved Puddling Furnace, for the better production of manufactured iron, in the process of obtaining it from the pig.—Dated September* 7, 1832.

These gentlemen have found that pig iron, having undergone the action of the refining furnace, requires a degree of heat for its re-fusion—in the process of puddling—so great, that the materials of which this latter furnace is composed, are very speedily destroyed or rendered useless. They conceive that the refining furnace may be altogether dispensed with; and they suggest a process whereby the puddling may be conducted on a more economical and equally efficient plan.

Their improvement is extremely simple in its principle. It is the excessive heat which destroys the furnace; therefore their object is to disperse and carry off as much as possible of this heat from the furnace, without in the least lowering the temperature to which the iron must be submitted in the operation of puddling. Where it is possible to expose the whole external surface of the puddling furnace to the action of the atmosphere, its sides may be composed of plates of iron, fitly prepared; and the stream of atmospheric air will carry off a sufficient quantity of the heat to prevent the consumption of the material of the furnace.

Whenever such exposure is impossible, the patentees should surround their furnace with a series of pipes, so constructed as to serve as bridges for the furnace; and these pipes should be made to circulate rapidly a strong force of water, perpetually supplied, and regularly carried off as it becomes heated. Of course other means might be suggested; any good conductor of heat may be applied to the surface of the furnace, and the superfluous caloric may be carried off by radiation or otherwise.

They commence their process by throwing on to the bars of the furnace, a quantity of the slag, ore, or scoria, of the smelting furnace; and when that is in a state of fusion, they throw in the pig iron without its having undergone the usual operation of refining. When it is melted, the heat is increased until the iron boils; and the puddler works it until the slag or earthy matter is all carried away, and the iron remains pure: it is then ready for the forge hammers, or other proofs of its malleability.

The patentees claim as their invention only the carrying off some portion of the heat from the exterior of the furnace itself, and that by means of atmospheric exposure, or aqueductory pipes.

[*Rep. Pat. Inv.*

¶ List of French Patents.

A List of Patents for Inventions, Improvements, and the introduction of Foreign Inventions or Improvements, granted in France during the second quarter of the year 1832.*

(Continued from p. 37.

[TRANSLATED FOR THIS JOURNAL.†]

J. Jul. Josselin, lace maker, Paris, April 13th, (5 years.) New corset trimmings, with or without clasps, by the use of which corsets may be instantaneously unlaced. (P. Improv.)

F. J. C. Klein, from Strasburg, residing at Paris, June 10th, (15 years.) A new means to insure safety, applicable to all sorts of carriages. (P. Invent. Improv.)

J. J. Laborde, teacher at Bordeaux, June 30th, (15 years.) Preparation of a hard and transparent substance, which he calls a *new diaphanous and everlasting paper*, intended to be used for all sorts of writings and drawings. (P. Invent.)

A. Lioret, jr., Paris, June 30th, (5 years.) A carriage for the transportation of firewood. (P. Invent.)

Mathieu de Dombasle, Roville, (Department of Meurthe,) May 19th, (15 years.) Apparatus for pursuing what he calls a process for decoction, for extracting sugar from beets. (P. Invent.)

James Milligan, England, represented at Paris by Mr. Truffault, June 5th, (15 years.) Processes for purifying and refining raw sugar, and other substances. (P. Invent. Improv. Import.)

A. M. Noverre, Paris, April 2nd, (10 years.) A machine for manufacturing bread and biscuit dough. (P. Invent. Improv.)

H. Pape, piano manufacturer, Paris, April 8th, (10 years.) A new application of a sounding board, &c. to different kinds of pianos. (P. Improv.)

A. Perpignan, Paris, May 30th, (5 years.) An improved machine by which a single workman can keep in motion two weaving looms. (P. Import.)

Rabaud, Brothers, & Co. of Marseilles, June 18th, (10 years.) A machine by them called *screw-ways*, for raising ships from the water. (P. Import.)

J. F. Renaud, dyer, Lyons, April 27th, (5 years.) Improved processes for dying various stuffs. (P. Improv.)

Richefeu and Fleschelle, bakers, Paris, May 19th, (15 years.) A machine for mixing dough. (P. Improv.)

* In the following list P. Invent. denotes a patent for an invention. P. Invent. and Improv. a patent for invention and improvement. P. Improv. a patent for an improvement. P. Import. a patent for the importation, or introduction of a foreign invention. P. Import. Improv. a patent for introduction and improvements. P. Invent. Import. a patent for invention and importation.

† By request of the Committee on Publications.

J. A. Robert, medical student, Paris, April 27th, (15 years.) A kind of fire arms, loaded at the breech, and cocked by the motion of raising it. (P. Invent. Improv.)

J. B. Rockelines, captain of artillery, and P. Servel, coachmaker, Montpellier, June 30th, (5 years.) A carriage which cannot be overset. (P. Invent.)

J. Salichon, engineer, Paris, June 27th (15 years.) A new system of navigation. (P. Import. Improv.)

A. D. Sisco, locksmith, Paris, April 13th, (5 years.) An instrument called a *setting spring box*, containing all the tools necessary for taking to pieces and putting together fire arms. (P. Improv.)

A. J. P. Thilorier, Paris, May 16th, (10 years.) An improved machine to compress gas. (P. Invent.)

A. E. Tromfrette, Paris, May 7th, (10 years.) A new method of hanging gig bodies. (P. Invent.)

Virbent, brothers, Toulouse, June 18th, (10 years.) A new method of making bricks, cut by mechanical processes. (P. Invent.)

J. M. Vouret, architect and artist of Louviers, residing at Paris, June 30th, (10 years.) A machine by him called a *moving fuller*, adapted to fulling and felting. (P. Invent.)

J. Wall, tinman, and De Laveloye, engineer, Paris, April 8th, (10 years.) A lamp, called a *chemical lamp*, keeping a constant level, &c. (P. Improv.)

Recapitulation.—In the second quarter of 1832, have been granted in France 53 patents.

TRANSLATIONS.

Polytechnic Society of Paris.

The editor has received from M. De Moleon, of Paris, the subjoined prospectus of the intentions of this Society, and it will afford him sincere pleasure to be made the medium of communication between this institution and any of his fellow citizens. His public situation in the department of State affords him facilities for transmitting to Paris papers or other articles if delivered to him free of expense, in the city of Washington, or left in the charge of the Actuary of the Franklin Institute in Philadelphia.

Not many years have elapsed since our country was dependent upon Europe for almost every thing which was new either in science or the arts, but in this particular a rapid revolution has been effected, and we have now much of our own to offer in exchange for the information which we derive from the old world; and the principle both of national and individual honour urges us to be on the alert in cementing those ties by which the friends of literature and science all over the world are united, and form one great republic, whose united aim is the attainment of the highest intellectual, moral, and physical good.

"Polytechnic Society.—This society has been established by

the former pupils of the polytechnic school, all of whom are conversant with the useful arts, and with commerce.

The object of the society is to promote the progress of the useful arts, and to supply the wants of the manufacturing, commercial and agricultural classes, more especially in France. Its principle means are—

1. An extensive correspondence with its members at home and abroad.

2. A capability, in consequence of an understanding with the heads of establishments, of seeing all orders faithfully executed.

3. A large collection of very perfect models of machines to serve as specimens, and to be exhibited at a particular place.

4. The *Receuil Industriel, &c.* of M. De Moleon; a valuable and interesting journal, which is the vehicle of all the observations and discoveries of the society, and of the results of the communications of its members in every part of the world.

In its organization are included—

1. The class of manufacturers, who attend to the interests of manufacturers, machinists, &c.

2. The class of manufacturers, who watch over rural economy.

3. The class of commercialists, whose vigilance is directed to commerce and its various dependant interests.

Foreign ambassadors are invited to supply the wants of their respective countries through the agency of this society; they will address '*Au directeur de la Société Polytechnique, Rue neuve-des-Capucines, No.* 13 *bis.*' "

M. De Moleon, in a letter to the Editor, says that, "The design of this society is to supply the wants of the productive classes in all countries; to obtain for the use of manufacturers, mechanics, agriculturalits, and artists, the machines which may be useful to them, either in the form of models, or of operating instruments; to attend to their completion, and the transmission of them wherever they may be required; to furnish to those engaged in commerce, such documents, and other aids as may contribute to its prosperity."

Conditions of a Prize proposed by the class of the Mathematical and Physical Sciences, of the Imperial Academy of Sciences of St. Petersburgh, at their sitting on the 10*th of January*, 1833.

"The experiments of Gay Lussac and Thénard, on the manner in which potassium acts in ammonaical gas, has made us acquainted with a peculiar compound to which those philosophers gave the name of *azoture ammonaical du potassium.* Although this name is expressive of a particular mode of combination, the experiments of the French chemists have not sufficed to determine with sufficient precision the elementary composition of this substance, besides which the repetition of these experiments by Sir H. Davy have been attended with different results. It is required, therefore, that the composition of the *azoture ammonaical du potassium* should be ascertained with

all the precision which the present state of science admits. These new experiments should be preceded by a review of those of Gay Lussac and Thénard, and those also of Sir H. Davy. Regard should be had likewise to what is said upon this subject in vol. ii. of the French edition of Berzelius' Treatise on Chemistry.

"The author of a memoir competing for the prize, will, after having determined with precision the elementary composition of the substance in question, endeavour to establish from his experiments what he deems the most probable mode in which the combination takes place, so as properly to designate the nature of the substance analyzed.

"Essays for this prize may be written either in the Russian, German, French, or Latin languages, and addressed by their authors, anonymously, to the perpetual secretary of the academy, prior to the 1st of August, 1834. The prize of 1000 Holland ducats, will be awarded at the public sitting which will be held on the 29th of December of the same year. The essay which obtains the prize will be printed at the expense of the Academy."

The foregoing proposal was transmitted by the St. Petersburgh Academy to the American Philosophical Society, and has been furnished for publication in this Journal.

Thoughts on the Casting of Statues in Metal. By John Robison, Esq. Sec. F. R. S. E.

When we consider, in a superficial manner, the comparatively small number of ancient bronze statues which have reached to our times; or read the animated, though somewhat ludicrous, account given by Benvenuto Cellini, of the obstacles he encountered in casting the statues of Perseus;* and when we advert to the large sums required in the present day for casting works of art in bronze, we are at first apt to imagine that the great cost of such works must be the consequence of some mysterious difficulty in the process; but if we go on to examine more closely into the grounds on which this opinion is founded, we begin to perceive the anomaly of any such difficulty being supposed to exist in this country, where immense works have been executed in cast metal, works requiring a rigid accuracy of ultimate dimensions not at all necessary in statuary, in which, if the relative proportions be truly kept, no injurious effect is produced by the shrinking of the metal which takes place in cooling.†

On farther consideration, we are compelled to admit, that where skilful founders and capacious furnaces abound in every district,

* Cellini's difficulties must have arisen from want of power in his furnace, as he says he overcame them by debasing his bronze with pewter, and by getting some well-dried firewood from a neighbour.

† The casting of a cylinder for a steam engine of 200 horses' power, is a more delicate operation than that of a group of statuary; an air hole or flaw, which might be imperceptible, is easily repaired in the statue, would be fatal to the other, though it might not be discovered until great expense had been incurred in finishing it.

where the most intricate castings are daily and hourly made in masses varying in weight from a few grains to many tons, the difficulty, *if any really exist*, should not be sought for in the moulding pit of the founder.

The question then comes to be asked, What is the reason that we see so few great statues in metal, and why are modern ones so costly in their execution? We apprehend the true reply is that bronze, the material usually employed in statuary, is dear; and, that as casting in bronze is not a common operation, furnaces have to be erected, and workmen collected, at a great expense for each separate occasion.

If it be allowed that these are the principal causes of the comparative rarity, and of the great cost of bronze statuary, it is surely worth inquiring, whether, by employing cast iron instead of bronze, we may not materially diminish the cost; and whether, if, in making this substitution, there be any thing likely to arise to counterbalance the advantage which we should gain from the great saving of expense.

In employing iron as the material instead of bronze, we should make a double profit, first, from the cost of the one metal being about a twentieth part of that of the other: and, secondly, from the circumstance, that, in the immediate vicinity of most places where such castings would be required, founderies would be ready with numerous workmen fully competent to undertake more difficult tasks than would have baffled Cellini with the aid of the driest firewood which Florence could have furnished him.*

One component part of the price of an original statue still remains to be adverted to. We mean the remuneration to the artist who designs the model, and superintends the moulding. This, every lover of the fine arts would wish to be liberal; but when the aggregate expense is unnecessarily great, and when the sculptor is forced to assume the (to him) foreign employment of a brass founder, he may often be obliged to sacrifice a portion of what he would be entitled to expect as the reward of his talent, or the recompense for the risk and anxiety he is made to undergo.

If, by adopting a cheaper material, and a less expensive method of casting, we should succeed in greatly reducing the cost of statuary, we could more easily afford a liberal remuneration to the genius of the sculptor, the natural consequences of which would be, that more talent would be called forth, and the public places of our cities would soon be enriched by numerous works of art: perhaps we should by degrees come to vie even with those countries whose more favourable climates have led to a greater development of talent in this branch of the arts, than we have hitherto been able to boast of manifesting.

It will perhaps be objected by some persons, that iron is too mean

* Where fuel is scarce, and of inferior quality, artists will necessarily prefer that metal of which they can accomplish the fusion. If the Greeks or Romans had possessed pitcoal and iron, they would probably have used them in their founderies; having only wood, they used bronze. The Dutch, who have turf for fuel, make statues of lead, while the Belgians having coal mines are now making them of iron.

a material to be used in the higher classes of statuary, but we apprehend that this is a prejudice which will yield on a little reflection. We do not think iron is too mean to form the main-spring of a chronometer, the sabre blade of a hussar, or the sword hilt of a courtier, in which latter form, we learn from Mr. Babbage, it has increased its original value 973 times.* If fitness for the end be the criterion we are to judge by; and if iron be susceptible of taking a sharper impression from a mould than bronze, (which no one can doubt who examines the Berlin and other similar castings,) we are bound to admit that in this respect at least, it is a better material for doing justice to the model of the artist; we may then proceed to inquire, whether there be any thing in the nature of the metal to be likely to make it less durable than bronze.

In one material point iron statues must have the advantage, as the labour which would be required to overthrow and break up a large figure, would scarcely be repaid by the price obtainable for its fragments; while the experience of ages shows us, that the marketable value of bronze affords an irresistible temptation in times of popular tumult, and that gods and goddeses, when made of that material, are not always immortal.

If danger be apprehended from the liability of the surface of iron to deteriorate by oxidation, we would say, that there is not much difference in this respect between bronze and *cast* iron; and that if the same means be taken to prepare and preserve the surface of an iron statue, as is usual with a bronze one, the weather would make little impression on it. We see around us examples of coarse castings, to the preservation of which little or no attention has been paid, and in which no sensible degradation of the surface has taken place, even in long periods of time: it may therefore be fairly inferred, that by the exercise of a little skill, and of a moderate degree of attention, the external appearance of a grand work of art in iron, may be made pleasing to the eye of taste, and may be preserved uninjured for generations.

If we be not greatly mistaken in the effects which must flow from the late improvements in the smelting of iron ore, which have been introduced in some of the furnaces on the Clyde, cast iron of the finest quality for such purposes, will soon be so cheap that we shall see it largely employed for architectural decoration. We should take advantage, therefore, of the means which nature and art have so liberally bestowed on us; and we should strive to make Britain as distinguished for her display of the fine arts, as she has hitherto been for her success in the mechanical ones. [*Edin. Jour. Science.*

* Many of those beautiful miniature statues in French clocks, which we consider as bronzes dorés, are, in point of fact, made of cast iron; but as the gold cannot be applied by amalgamation, as in the case of bronze, the iron ornament may be detected by the inferior appearance of the gilding.

Remarks on Friction, and the Resistance of Moving Bodies.

When Mr. Grahame's experiments on the results of drawing boats on canals at high velocities were first made known, between two and three years ago, they excited some surprise, for they seemed at first to overthrow the established doctrine, of the resistance to the motion of a boat increasing as the squares of the velocities. It was then, however conjectured, that the reason of this apparent departure from the law of resistance, was simply that the boat at high velocities is partially lifted out of the water, and becomes, therefore, a boat of *less sectional displacement.**

Mr. M'Neill's late experiments prove this to be the fact; and the apparently wonderful effects of high velocities are now admitted not at all to disturb the received law as to the resistance.

The consideration of these experiments and their results, has led me to consider whether the same principle which operates to cause a boat to rise out of the water when drawn at a high velocity, does not extend much further. It seems to me that the natural result of very high velocities of a moving body, on any surface, or in any medium, will be, that the body will be *partially lifted up* from its contact with the medium or surface which supports it, and so meet a less number of *resisting particles.*

It has been observed by several engineers (though no accurate experiments have been made,) that the carriages drawn on a rail-way move actually with *less friction* at very high velocities, (say twenty miles per hour,) than at low or moderate ones, (say seven miles per hour.†)

Now this effect could not take place except by the rails being relieved of part of the load or pressure of the carriage; in other words, by the carriages being *partially lifted up* from *contact* with the rails. I do not mean, of course, that they *do not touch*, but they *touch less;* the rims of the wheels do not bite into the rails so much.

So on a common road, if a carriage be drawn very fast, it will be seen to skim along the surface of the ground. This effect is more sensible when the ground is soft, viz. when it approaches more the condition and properties of a fluid.

But all bodies that are not *perfectly hard*, approach more or less

* See a paper on Mr. Fairbairn's book—London Journal, second series.

† This observation is borne out by the calculations made of the *power exerted by the engines* of a locomotive carriage. These calculations were made on the assumption, that the friction of a carriage on a rail-way is a *constant quantity*; and by computing the number of turns of the wheels per minute (from the number of strokes of the engine, and also by the diameter of the wheels,) and multiplying the motion of the piston of the engine by *the constant resistance* it had to overcome, the power exerted by the engine was computed. It was found to be (by this mode of calculation) greatly beyond what the dimensions of the cylinders, and the consumption of steam, would correspond to. Hence it was inferred, that an erroneous ground of calculation must have been taken, in assuming the friction to be *constant*, and that it really must be *less* at very high velocities than at low ones—which conclusion, being supported by observation of facts, deserves weight.

the condition of a fluid, in so far as this, that whatever body be laid upon them will sink in (perceptibly or imperceptibly) to a certain amount, provided the weight of the body supported be sufficient to cause any friction.

Then, when the body supported, (a carriage, for instance,) is put in motion, or drawn by external force, it must displace, (viz. either actually crush or else depress,) those particles of matter of the supporting body that lie in front of it, and hence resist its motion.

Now the particles of fluids, whether of great or little density, (and in this examination I treat materials apparently hard, as fluids,) require always, according to their density and adhesion, a certain time to yield to force, and to change their position. If we cause a body to move through them, at such a velocity, that the time of its increments of motion is not less than the time that the particles require to be disturbed, then *the depth to which the supported body sinks in the supporting medium,* does not change; and the resistance to the motion of the body is regulated by the number of particles of matter that it has to crush or depress.

But if we increase the velocity of the drawn body up to such a point, that the time of the increments of its motion is less than the time required by the particles of the resisting medium to yield force, then the moving body will be lifted up, and will not displace so great a number of particles of the resisting medium; hence the friction or resistance to the motion of the body will be diminished.

I suppose, in fact, the wheels of a carriage, whether on a common road or on a rail-way, to be *immersed partly* in the material of the road or rails, as a boat is partly immersed in a canal—the difference of condition being in degree and not in kind. And I suppose that at high velocities, the wheels of a carriage are lifted up a certain amount, *so as to displace fewer particles* of the matter composing the road, as a boat is found to be lifted up at high velocities, and so to have a less sectional displacement than at low velocities. If this mode of considering the subject be correct, it will show the reason of the fact said to be observed, respecting the decrease of friction on rail-roads at very high velocities.

Your obedient servant,

T. S.

[*Lond. Jour.*]

Observations on the Deviation of the Compass; with examples of its fatal influence in some melancholy and dreadful shipwrecks. By the Rev. William Scoresby, *F. R. S., &c. Communicated by the Author.*

(Concluded from page 43.)

Of a nature somewhat similar, but vastly more calamitous, was the loss of his Majesty's ships St. George of 98 guns, Defiance of 74 guns, and Hero of 74 guns, in the winter of 1811-12.

The Hero, Captain Newman, with the Grasshopper sloop, Captain Fanshawe, sailed December 18,1811, from Wingo Sound in the Cattegat, with the Egeria, and the Prince William, armed ship, and a convoy of 120 sail. This vessel, the Hero, instead of standing well to the westward, to compensate for the deviation and the action of a north-westerly wind, steered the direct compass-course for the Downs; and having, in the night of the 23d, separated from most of the convoy, she struck the ground in a heavy squall of wind and sleet, upon the Haak Sand, near the Texel Island. Some of the convoy which kept by her shared the same fate; but the greater part, aware, apparently, of the danger into which they were running, hauled off to the westward and escaped. The Hero, after enduring the violence of the concussions against the ground during the night, was seen in the morning totally dismasted, and lying on her beam ends. She soon went to pieces, and the state of the weather preventing assistance reaching her, all the people, with the exception of eight who were washed on shore, perished with her.—*Naval Chron.* 1812, p. 43.

Though thus stranded on the coast of Holland, the captain, it appears, was so confident of his being sufficiently removed from that shore, that when the ship was found to be in danger, he ordered her to be steered to the S. or S. SE. (a course leading directly upon the sand,) from the supposition that he was upon some shoal on the British coast! Surely a person entrusted with the command of a line-of-battle ship, could not be so ignorant of the common rules of navigation as to fall into such a disaster by a mere blunder, especially when different persons in the ship must have kept a reckoning, and mutually have secured themselves against such a chance of error. There was doubtless a great want of prudence shown by the Commodore, yet I imagine that the deviation which he had, doubtless, neglected to take into the account, had a great share in producing the catastrophe.*

The St. George and Defiance were circumstanced a little differently. The former, under Admiral Reynolds, had been dismasted in the Baltic, but being refitted, and considered capable of performing the passage, she made the attempt accompanied by the Defiance. Unfortunately, they steered a direct compass course, and being overtaken by the same gale under which the Hero suffered, both ships went on shore on the western coast of North Jutland. Of the crew of the Defiance, which went to pieces half an hour after striking, only six men were saved, who got to shore on pieces of the wreck. Eleven

* A Mr. White, of Whitby, who was employed as a pilot on board of one of the transports, being told on the fatal day of the accident that the Commodore had made the signal to steer S.SW., ordered his ship to be hauled up W. SW., observing, in the quaint language of a sailor, "If they stand that way they will all sleep in their shoes before morning." This prediction was awfully fulfilled, whilst Mr. White, by his prudence, escaped. He knew nothing of the local attraction of the compass, but he knew, from experience, that something carried the ship towards the Holland coast. This prudent sailor was afterwards, I understand, called up to the Admiralty to be examined in respect to the cause of the disaster that had occurred.

of the crew of the St. George most providentially escaped in a similar way; " and when the last of them left the ship, on the afternoon of the 25th, the Admiral and Captain were lying dead beside each other on the quarter deck, together with the greater part of the crew. Only about fifty remained alive, whose cries were heard till it was dark. The ensuing night terminated their sufferings."

The number of persons that suffered in these three ships, including the whole of the officers on board, amounted to nearly 2000, being a greater loss of life in British seamen than has occurred in some of the most splendid battles in which our fleets have been engaged.

Under circumstances, I believe, somewhat similar to those of the Hero, was lost the Minotaur of 74 guns, Captain Barret, on the Haak Sands at the mouth of the Texel, on the night of the 22nd of December, 1810. She left Gottenburg on the 15th, in company with the Plantagenet and the Loire, with sixty sail of ships under convoy, in tempestuous weather. During the gale she separated from the ships in company, most of which, if not all, made their escape. One hundred and ten of the crew of the Minotaur succeeded in saving themselves in the boats; the remainder, about 360 in number, perished.

Towards the production of all these dreadful calamities, the *deviation of the compass*, I am persuaded, greatly contributed. This, by a very little calculation, we shall be able to render extremely probable, if not to prove it. The distance from Bovenbergen, on the north-west coast of Jutland, to Yarmouth Roads, is 330 miles on a true course S. 42° W., or course per compass, (the variation being 25°) S. 67° W. Let the *mean deviation* of a vessel on an east or west course be 5°, a quantity frequently met with and sometimes exceeded, and let the points of change be north and south, such a vessel, on coming from the Baltic, and steering S. 67° W., or W. SW. nearly, will have 4½° westerly deviation—that is, by the attraction of the vessel the north point of the compass will be drawn towards the west 4½°. By this deviation, therefore, if no allowance be made for it, she will be carried, within the limits of the proposed distance, twenty-six miles to the south-eastward of her reckoning. Now it is very evident, from a simple inspection of the chart of the German Ocean and English channel, that had there been an allowance of twenty-six miles made on the courses of the vessels already mentioned as having been lost on the Haak sand, *an allowance which the wind at the time would have amply admitted*, they would have all gone considerably to the westward of every danger, and the two men-of-war, the Hero and Minotaur, and four transports, together with above 1000 men, would have been saved.

As to the other case, (the St. George and Defiance,) I am not sufficiently acquainted with all the circumstances to speak decidedly of the influence of the local attraction. But I think it exceedingly probable, that had their commanders been fully aware of the deceptive influence of this, then little understood, phenomenon, they would at all events have steered a course so much more westwardly as might, by possibility, have preserved them from the catastrophe which ensued.

Various methods have been devised for the discovery and correction of this insidious influence, some of which it may be proper, in conclusion of this article, briefly to describe.

The first regular process employed for the determination of the "deviation" was to take the bearing of a distant object by a compass in the binnacle, whilst the ship was laid at anchor or at moorings, and successively to observe the relative bearings when the ship's head was put on each point of the compass in succession, as she was gradually "swung" round. In this case, the bearings which were found to accord with the correct magnetic meridian, determined the points of change, or those positions of the ship's head in which the compass gave correct indications; and the differences of the bearings in all other positions of the ship's head, indicated the quantity of local attraction on the several courses.

Another method which I adopted in my own practice was still more simple. A compass was secured at the main top-gallant-mast head, where, being remote from all iron, and directly above the attraction of the ship, it was found to give *the correct magnetic position* on every course alike. This was made the standard compass. Comparing, therefore, the course steered by the binnacle compass with that indicated by the standard, which could be done as frequently as requisite in calm weather and smooth sea, the deviation in that particular position of the ship's head was at once determined. Occasionally a whole series of differences was observed, so that the deviation on every course might be known.

A beautiful and philosophical detector of the deviation has for some time been in use in the navy, the invention of Mr. Barlow, in which a plate of iron is temporaneously affixed in proximity to the steering compass, so as exactly to double the influence of the ordinary attraction of the ship; this increase upon the usual deviation affords, if the position of the plate be correct, a measure of the local attraction produced by the iron in the vessel. The discovery of the position of the plate, however, is a matter of more experimental nicety than can be usually expected from the men of any profession as a body; and no provision, that I am aware of, short of a new determination of the position of the plate, can be obtained for such accidental changes of the local attraction as ships in general are liable to on any change of position in their guns or other masses of iron on board. Where, however, the iron in the vessel remains unaltered, both in quantity and position, Mr. Barlow's plate will, unquestionably, be found capable of exhibiting the influence of the local attraction, generally, throughout the globe, not only with useful, but even philosophical accuracy.

Another invention for the same purpose remains only to be noticed, which is, the beautiful apparatus of Lieutenant Colonel Graydon, of the Engineers, denominated by him the "Celestial Compass."

This ingenious instrument, by a beautiful arrangement of graduated arcs and circles, is so adjusted for the latitude of the place and declination of the sun, that a movable arm, bearing a lens for the concentration of the sun's rays to a point at the axis of the instrument, can be made to traverse in an oblique plane exactly coinci-

dent from the eastern to the western horizon, with the plane of the sun's motion. The speck from the rays of the sun, concentrated by passing through the lens, is received upon a small disk of ivory, and made to coincide, by a vertiginous motion of the instrument, with a dot at the centre of the disk. As, however, the speck from the lens, when the instrument is adjusted for latitude and declination, will always fall either above or below the centre of the disk, except when the azimuth of the arm, in reference to the instrument, is the same as that of the sun in reference to the earth, the simple act of placing the instrument so that the speck may fall upon the dot, will, of necessity, put it in the exact meridional position. By comparing, then, the course steered by the binnacle compass with the true meridian pointed out by the celestial compass, the variation and deviation conjointly will, under existing circumstances, be correctly exhibited, as it were, by direct observation; or, which may be of equal importance, the *true* direction of the ship's head will be at once determined. The *apparent time* is likewise given by the horary circle, without calculation or additional trouble. And besides these properties, so useful and important in practical navigation, the celestial compass has other capabilities, such as the determination of the *latitude of the place*, within remarkably small limits, by a single observation; yet, in this case, as in all others in which the instrument is used, every result is independent of the visible horizon.

This instrument, so scientific in principle, and so strikingly satisfactory in its results, especially as regards the determination of the local attraction of ships, will, it is to be hoped, when better known, find general acceptance with nautical men.

[*New Edinburgh Philos. Mag.*

Method of obtaining Cream from Milk. *By* George Carter, *Esq.*

The process of divesting the milk of its component portion of cream, to an extent hitherto unattainable, has been effected by Mr. Carter, and is thus detailed by that gentleman in a paper presented to the Society of Arts.

A peculiar process of extracting cream from milk, by which a superior richness is produced in the cream, has long been known and practised in Devonshire; this produce of the dairies of that county being well known to every one by the name of "clotted," or "clouted cream." As there is no peculiarity in the milk from which this fluid is extracted, it has been frequently a matter of surprise that the process has not been adopted in other parts of the kingdom.

The opportunities, says Mr. Carter, which I possess of making experiments connected with farming, induced me to direct my attention to the produce of the dairy, with a view to increasing the quantity and quality of cream and butter. Having, therefore, made some inquiry into the practice of the Devonshire dairyman, I found, that besides the improved quality of the cream, a larger quantity of butter

was produced by this mode. I therefore adopted their system as the groundwork of my experiment.

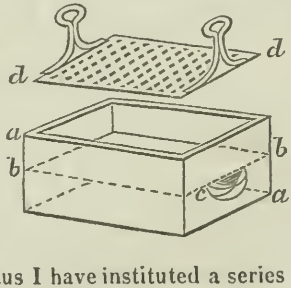
I found, however, that their process is attended with several disadvantages. The mode of applying artificial heat is rude, and the effect uncertain, being entirely dependent on the skill of the dairyman: the result is also perpetually varied by the weather, and other accidental circumstances, over which he has no control.

My first object, therefore, was to construct my apparatus so that its operations should be (as nearly as possible) invariable, confining myself only to that part of the Devonshire process in which heat is applied to aid the separation of the cream from the milk. After a variety of experiments on the temperature applied, the period of its application, and the form and material for the vessels, I obtained the greatest results by adopting the following process:—

A four-sided vessel *a a* is formed of zinc plates twelve inches long, eight inches wide, and six inches deep, with a false bottom, *b b*, at one-half the depth.

The only communication with the lower compartment is by the lip *c*, through which it may be filled or emptied.

Having first placed at the bottom of the upper compartment a plate of perforated zinc *d d*, the area of which is equal to that of the false bottom, a gallon (or any given quantity) of milk is poured (immediately when drawn from the cow) into it, and must remain there at rest for twelve hours; an equal quantity of boiling water must then be poured into the lower compartment through the lip *c*, it is then permitted to stand twelve hours more, (i. e. twenty-four hours altogether,) when the cream will be found perfect, and of such consistence that the whole may be lifted off by the finger and thumb. It is, however, more effectually removed by gently raising the plate of perforated zinc from the bottom by the ringed handles, by which means the whole of the cream is lifted off in a sheet, without remixing any part of it with the milk below.



With this apparatus I have instituted a series of experiments; and, as a mean of twelve successive ones, I obtained the following results:—

Four gallons of milk, treated as above, produced in twenty-four hours, four and a half pints of clotted cream, which, after churning only fifteen minutes, gave forty ounces of butter.

Four gallons of milk, treated in the common mode in earthenware pans, and standing forty-eight hours, produced four pints of cream, which, after churning ninety minutes, gave thirty-six ounces of butter.

The increase in the quantity of cream, therefore, is $12\frac{1}{2}$ per cent., and of butter upwards of 11 per cent.

The advantage, however, is not limited to this increase of quantity, since it appears that in my process ten or fifteen minutes churning is sufficient to produce butter, whilst it requires ninety minutes to produce the same effect with the common cream. The results are also constant; no variety in flavour, colour, or consistency, is observable, although my experiments have been made under circumstances which would have affected all these qualities in the common process.

I am not prepared to declare how much of the advantage of this operation depends on mechanical, and how much on chemical action. It has been long known that the application of artificial heat has facilitated the separation of cream from milk, probably by forming an ascending current in the fluid, as well as disengaging the suspended particles of cream by rendering the whole more liquid. But I have found that the material of which I make my vessels is a very important feature in the process; for the cream is formed in zinc vessels many hours earlier than in earthen ones. I hazard a conjecture, that this is owing to a galvanic effect, which is produced by the lactic and acetic acids (developed in the milk by heat and rest) acting slightly on the zinc plates of the vessel. We have, therefore, two fluids acting on one metal, which is well known to be a galvanic arrangement of the second order. The acids, which would otherwise cause the coagulation of the milk, are thus taken up by the zinc; and the milk by remaining more perfectly fluid admits the easy ascent of the suspended cream. I have ascertained, on analysis, the presence of acetate and lactate of zinc in the skimmed milk, which would, therefore, seem to favour this hypothesis.

I ought to state, that my experiments have been made on land which is not most favourable for the production of butter, it being cold or gravelly; indeed, the whole of the Kentish land is unfit for producing cheese, a certain proof of its inferiority. As, however, my experiments have been comparative, and made with the produce of the same land, so it is reasonable to expect that proportionate advantages will be obtained in all cases, be the land richer or poorer.

I do not claim the merit of originality in this process farther than in the use of the zinc vessel, and the mode in which the heat is applied, by which the results are rendered certain and invariable; neither do I profess to have obtained the maximum of quantity which can be produced by this process. The operation, however, is so simple, and its efficiency so apparent, that it cannot be too generally known.

The experimental farmer will instantly perceive the advantages accruing from its adoption, and probably his attention to the subject may produce greater results. I shall feel richly rewarded if, by exciting an interest on the subject, I can produce any, the slightest, improve-

ment in the quality or mode of producing an article which may properly be deemed one of the necessaries of life.*

[*Trans. Soc. of Arts.*

¶ *Secrets in Pottery.*

(Concluded from p. 60.)

Blue Printing Bodies—Slip State.

Nos.	1	2	3	4	5	6	7	8	9	10	11	12	13
Blue clay	35	60	35	40	27	56	60	55	57	50	50	66	40
Black do.	15		10	15	11					10	20		10
Brown do.	15		15	10	12								10
China do.	12	20	20	17	25	27	18	22	23	18	10	17	20
Flint	20	20	18	15	25	14	20	20	16	20	19	17	20
Cornwall stone	3		2	3		3	2	3	4	2	1		2
Parts	100												

The clay slips 24 oz. Stone 28 oz. to pint. No. 12 is Mr. Spode's. (For glaze, see blue printing glazes, No. 8.)

Blue Printing Glazes.—Nos. 1 and 2.

Fritt.			Glaze.		
Glass	16	16	Glass		35
Red lead	5	4	W. lead	42	28
Arsenic	1	1	Cornwall stone	33	14
Nitre	1	1	Flint	4	3
Blue calx	1½ oz.	1	Fritt	21	20

No. 3. (Meigh's.)

Fritt.	lb.	Or		Glaze.	
Glass	18	Glass	45	Fritt	20
Red lead	2	Pearl ash	3	W. lead	46
Arsenic	1	Blue calx	3½ oz.	Cornwall stone	29
Nitre	1			Flint	5
Blue calx	3 oz.				

No. 4. (Meigh's.)

Fritt.		Or		Or	Glaze.	
Glass	20	Glass	50	50	Fritt	12
Arsenic	1½	Red lead	6	6	W. lead	50
Nitre	1½	Blue calx	7 oz.	7 oz.	Cornwall stone	26
Borax	1				Flint	12

* It appears from Mr. Carter's statement that milk which has been subjected to his process, is more or less impregnated with the soluble salts of zinc. The well known astringency of these salts, and their emetic quality when in a state of moderate concentration, induced the committee to inquire what use is made of the milk after separation of the cream. Mr. Carter replied that it is employed wholly in feeding pigs, and that the health and growth of these animals do not appear to be at all affected thereby.

(No. 5. W. Moor's.)

Fritt.	lbs.	Glaze.	
Glass	20	W. lead	50
W. lead	$1\frac{1}{2}$	Cornwall stone	26
Salt	1	Dry flint	12
Arsenic	4 oz.	Fritt	10
B. calx	4 oz.	Borax (calcined)	2

No. 6. (Wilson's.)

Fritt.	lb.	Fritt in gloss oven, then add		Glaze.	
Glass	24	Glass	130	W. lead	49
Lead	5	B. calx	9 oz.	Cornwall stone	24
Arsenic	1	Grind at mill.		Fritt	19
Nitre	2			Flint	8

No. 7. (Spode's.)

Fritt.		Glaze.	
Glass	24	Fritt	12
Flint	6	W. lead	50
Nitre	4	Cornwall stone	24
Borax	1	Flint	6
B. calx	4 oz.	Glass	8

No. 8. (Spode's.)

Fritt.	lb.	Or	lb.	Glaze.		Or lb.
Glass	34	Flint	16	Dry Flint	20	18
Arsenic	2	Nitre	4	Flint	6	5
Nitre	2	Red lead	4	Cornwall stone	30	28
Red lead	10	Borax	8	W. lead	50	49
B. calx	1					

Grind with 100 lbs. glass at mill. A few ounces of nitre melted in each charge before dipping.

No. 9. (Spode's.)

Calcine, pick, pound, and sift Cornwall stone, in 6 saggers.

Fritt—Cornwall stone	60 lbs.
Borax	30
Dry flint	30

in bottom of gloss oven; sufficient for three portions of glaze.

To two saggers add for one glaze,

	lb.	Or
W. lead	340	54
Cornwall stone	160	26
Flint glass	56	10
Dry flint	28	6
Pearl ash	15	3
Sal ammon.	$4\frac{1}{2}$	1
		100

No. 10. (J. Yates.)

In two Saggers, washed with flint, put

Cornwall stone	53 lbs.
Salt	2
Borax	2

In one sagger do. put	Dry flint	. .	30
	Borax	. .	4
Do. half inch thick	White glass	. .	34
	Nitre	. .	1
	W. lead	. .	4

Fritt in bottom of gloss oven; pick, pound, and sift; grind at mill; stain with 5½ lbs. of stain, (No. 2 of raw glazes, afterwards specified.) Grind well 113 lbs. W. Lead; then add fritt; mix well, and pass through 16 lawn.

No. 11, improvement on No. 10. (J. Clowes.)

Into one sagger put		Into another	
W. glass .	34 lbs.		
W. lead .	4	Dry flint .	30
Salt . .	2	Borax .	6
Nitre .	1		

Pick, pound, and sift through a $\frac{3}{16}$ riddle, mix well, and fritt in gloss oven; then again pick, &c., carefully; and the same with 53 lbs. calcined Cornwall stone; grind at mill; then add 113 lbs. best W. lead, and 5½ lbs. stain, (No. 2 of raw glazes.) In each preparation, 17s. 8d. is saved; and J. Clowes says, this is a much better glaze.

No. 12.

Mix well.					Glaze (Blue.)	
Glass .	32 lbs.	also with	Nitre	1 lb.	W. lead	51
Corn. stone	10		Soda	1	Corn. stone	27
W. lead .	4		R. lead	2	Flint .	10
Pearl ash	4		B. calx	2 oz.	Glass .	4
Borax .	4	Fritt in gloss oven, and grind with 48 lbs. glass.			Fritt .	8

No. 13.

Calcine in gloss oven.			Glaze.	
W. Lead ,	12 lbs.	Grind well for use.	Fritt . .	4
Borax . .	6		W. lead .	50
Soda . .	4		Cornwall stone .	28
B. calx . .	4 oz.		Flint . .	12
Then add glass .	60 lbs.		Do. glass .	6

Raw Glazes.—Blue Printing.

No. 1. (Davenport's.)

W. lead	49	Flux without fritting,	
Cornwall stone .	22	Salt .	14 oz.
Flint .	7	Borax .	12 oz.
Glass .	22=100 parts.		

No. 2. (J. Barlow's.)

W. lead	49	Stain,	W. lead	2	Fritt in top of biscuit oven, then pick, pound, sift and grind.
Composition	24		Nitre	½	
Dry flint	14		Salt	1	
Glass	10		Glass	30	
Stain	3 = 100 parts.		B. calx	10 oz.	
Add dissolved borax 2 ounces.			Borax	1 lb.	

No. 3. (W. Moore's.)

W. Lead	52	Without fritting.		1 oz. blue calx, washed in 4 oz. of salt rock.
Cornwall stone	24	W. lead	51	
Flint	12	Corn. stone	25	
Do. Glass	12 = 100 parts.	Flint	12½	
Blue flux 7 oz.		Do. glass	11	
1½ flux to 1 blue.		Potash	½ = 100 parts.	

Glazes for Enamel, or Blue Edge.

No. 1.

Grind for 24 hours, Flint	20	Then dissolve in hot water, and add
Glass	20	
Cornwall stone	60	40 oz. borax
		24 ,, oxide of tin
		8 ,, nitre
		16 ,, salt
		190 lbs. lead.

When sifted, send to mill, and add 3 oz. B. calx before it can settle, else liable to blue spots.

No. 2.

Fritt, in gloss oven, 1 sagger washed	Flint	25 lbs.	Grind with Cornwall stone 57 lbs., and add
	Borax	3	W. lead . 117 lbs.
1 sagger flinted	Glass	22	Raw glaze stain, No. 2 . ½
	Salt	1	Or with do. . . 2½ for a
	W. lead	2	very excellent blue edge glaze. The stain
	Nitre	0½	to be twice ground and sifted.

No. 3.

Fritt.		Or		Glaze.	
Glass	50 lbs.	Glass	10 lbs.	Fritt	10
R. lead	2½	R. lead	1	W. lead	50
Bone	50	Arsenic	8 oz.	Cornwall stone	26
Salt	2	Nitre	8 oz.	Flint	4
B. calx	5 oz.	B. calx	3 oz.		

No. 4 and 5.

Glass	17	6
W. lead	55	54
Cornwall stone	21	28
Flint	7	12
B. calx	1 oz.	$1\frac{1}{2}$ oz.

No. 6.

B. Pr. Gl. No. 1 Fritt	13
W. lead	52
Cornwall stone	23
Flint	12=100 parts.
Flow with salt	6
Nitre	4

[*Mech. Mag.*

Biscuit Baking Machinery.

We observe with great pleasure in the Navy estimates for the present year a proposition for a grant for £2,000 to T. T. Grant, Esq., store keeper of the Royal Clarence Victualling Establishment, at Weevil near Portsmouth, for the invention of the ingenious biscuit baking machinery recently erected at that establishment. For the following very circumstantial description of this machinery, and statement of the saving effected by it, we are indebted to a recent number of the United Service Journal.

"The first procedure in this biscuit baking operation, consists, you may suppose, in mixing the flour and water together; but I should tell you that, antecedent to that, the establishment has ground the flour in mills, worked by the same machine which gives motion to those parts I am about to describe. Nor is this an immaterial point; for by it all possibility of mixing improper ingredients along with the flour is prevented, and precisely that proportion of the bran which is required in the composition of good biscuit is retained. I ought likewise to have mentioned before, that adjacent to the mills stands a series of four granaries, each capable of holding fifteen hundred quarters,—in all, six thousand quarters. The flour mill is furnished with ten pair of stones, by which forty bushels of flour can be ground and dressed, ready for baking, in an hour. The baking establishment consists of nine ovens, each thirteen feet by eleven, and seventeen inches and a half in height. These are heated by furnaces attached to each, so constructed that a blast of hot air and fire sweeps through them, and gives to the interior the adequate dose of heat in an incredibly short time.

"The commencement of the baking consists in introducing into a trough thirteen gallons and a half of water, and then allowing to enter it a sack of what is technically called biscuit meal flour, weighing 280 pounds. When the whole has been poured in by a channel communicable with an upper room, a bell rings and the trough is closed. A singular apparatus, consisting of two sets of what are called knives,

each ten in number, is made to revolve amongst the flour and water, by means of the machinery. This mixing lasts one minute and a half, during which time the double set of knives or stirrers make twenty-six evolutions. Each batch of the dough thus rudely mixed weighs 388 pounds, and forms eventually two suits and a half of bread, weighing 250 pounds, or, in other words, 1,250 biscuits, each suit, or batch, being 100 pounds in weight. The next process is to cast the lumps of dough under what are called breaking rollers, huge cylinders of iron, weighing 14 cwt. each, and moved horizontally by the machinery along stout tables. The dough is thus formed into large rude masses, six feet long by three broad, and several inches thick. At this stage of the business the kneading is still very imperfect, and some traces of dry flour may still be detected. These great masses of dough are now drawn out, and cut into a number of smaller portions, about a foot and a half long by a foot wide, and again thrust under the rollers. I forget how many times the dough is made to pass under these rollers, but sufficiently often to make the mixture so complete that the slightest trace of inequality is not to be discovered in any part of its substance. I should mention that two workmen stand, one at each side of each roller, and as the dough is flattened out they fold it up, or double one part upon another, so that the roller at its next passage squeezes these parts together, and forces the whole to mix. After this process has been gone through a sufficient length of time, the dough is cut into small portions, and being placed on large flat boards is transported by the sole agency of the machinery, in the most comical manner, from the centre to the extremity of the baking room. Here it is received by a workman, who soon places it under what is called the sheet roller, but it would be better named the blanket roller, for in size and thickness, and nearly in colour, it resembles a blanket. The kneading is thus rendered quite complete, and the dough is in a fit state for the oven, and it only requires to be cut into biscuits. This part of the proceeding is admirably contrived. It is effected by what is called a cutting plate, consisting of a network of fifty-two sharp edged hexagonal frames, each as large as a biscuit. This frame is moved slowly up and down by the machinery, and the workman, watching his opportunity, slides under it the above described blanket of dough, which is about the size of the leaf of a dining table, and in the next instant down comes the cutting frame, indents the sheet, but does not actually cut it through; for enough of the substance is left uncut to enable the workman at the mouth of the oven to jerk the whole mass of fifty-two biscuits unbroken into the oven. It may be asked, how it happens that the dough does not stick to the frame? but this is prevented by a most ingenious device. Besides the cutting portion of each of the two hexagons, there is a small flat open frame, movable up and down, carrying above it a ball of iron several ounces in weight. When the great frame comes down upon the dough, and cuts out the fifty-two biscuits, each of these minor frames yields to the pressure, and all the little iron balls are seen to rise up; but as soon as the great frame rises, the weight of the balls, acting on the little frames over each biscuit, thrusts the whole blanket

off, and allows the workman to pull it out. One quarter of an hour is sufficient to bake the biscuit, which is afterwards placed for three days in a drying room, heated to 85° or 90°, which completes the process.

"The whole nine ovens bake about a ton of bread an hour, or ten thousand biscuits. If, instead of nine, there were twelve ovens, it has been calculated that 70,000 cwt. of bread might be baked in a year. Now it appears that the average quantity issued from Depford, Portsmouth, and Plymouth, during the last five years, was 68,000 cwt.; consequently, if this branch of the Royal Clarence Victualling Establishment were increased by only three ovens (and no further machinery,) all the biscuit required by the navy might be prepared by the admirable process on one spot. The relative cost of making the above quantity of bread by hand, or by the machinery actually erected and in operation, I have taken some pains to ascertain—

Cost by machinery, . . .	£1,560
Ditto by hand, ...	5,260
Saving in the wages of labour. . .	£3,700

"From this saving there must, of course, be deducted a portion of the interest of the money laid out in the machinery. I say a portion of the interest, because the same steam engine which moves the baking apparatus, turns ten pairs of mill stones, and pumps up water for the supply of his majesty's ships, and it is only a small part of the power which must be kept in action at any rate, that is directed to these baking purposes. When, however, the large engine is not required to grind flour, or to pump up water, a small ten horse engine is set in motion, if it be required, to bake bread.

"The foregoing calculation of what twelve ovens could perform, is an estimate. The following statement is derived from actual experiment:—

"In 116 days, during 68 of which the work was continued for seven and a half hours, and 48 for five and three-fourths hours only, in all 769 actual working hours, equal to 77 days, at ten hours each day, the following quantity of bread was baked in nine ovens, at the Royal Clarence establishment—12,307 cwt. of biscuit, which is equal to 1,378,400 pounds.

The wages of the men employed in baking this quantity of bread, amounted to . .	£273	10	9½
If it had been made by hand, the wages of the men employed would have been . .	933	5	10
Saving in the wages of labour, . .	£659	7	0½

"In this, I may repeat, is not included any part of the interest of the sum laid out on the machine, or spent in keeping it in order. But in a very few years, at such an immense rate of saving, the cost of the engine and other machinery would be repaid.

"The machinery bread, though at first objected to by many per-

sons, has become universally popular in the navy. It is better, decidedly, than any which has heretofore been supplied to his majesty's ships, and it promises to keep better. Formerly the sailors very rarely, if ever, took up the whole of their allowance of bread; but since the machinery biscuit has been issued, it seldom occurs that a single pound is left behind. If the intention of stowing it in iron tanks be followed up, the fresh quality may be preserved for any length of time, and the 'remainder biscuit' after a voyage cease to be a proverb redolent of weavils, mouldiness, and dust."

[*Mech. Mag.*

Steam Carriages.

The London and Paddington Steam Carriage Company have tried and proved the effectiveness of their carriage, by taking it from Paddington to Londonwall, and thence up Houndsditch, through Whitechapel, (on market day,) and on to Stratford and West Ham, and returning the same way back again; thus proving its capability of proceeding through crowded thoroughfares without inconvenience or liability to accident to the persons in the carriage, or others. We have also on Monday begun to ply to and from Paddington to the city for hire; and intend, for the present, continuing to go once or twice a day for the purpose of developing the wants of the road, and also such imperfections as may appear in practice, in order that we may remedy them in the other carriages in progress of preparation. As soon as we have got two more carriages ready, the whole three will commence running in regular succession on this line of road, each carriage performing fourteen journeys to and fro per day, which is nearly the work of three omnibusses and thirty horses. During the early journeys of this single carriage the fare will be one shilling. We do not, however, wish people to think we have commenced business as we mean to go on; for, at present, we are really only going for the purpose of satisfying the public of the safety and perfect practicability of this mode of travelling, and also of getting practice on the road, so that we may find out and apply every improvement that may be requisite. When the novelty of the thing has worn off a little, it is to be hoped that the road will not be so crowded with curious gazers as it is now every time we go out, to the great prejudice of the speed of the vehicle, which it requires no small portion of skill and care on the part of the guide to steer with safety, through the multitude of coaches, gigs, carts, drays, &c. that constantly beset its path. As it is, a second journey each day would, *at present*, become a perfect nuisance; but as soon as the road, by our frequent journeys, becomes less crowded, we shall, even with the one carriage, go two or three journeys occasionally, perhaps more, as soon as we are satisfied that we have adopted every improvement in strength and quality that daily practice may show to be necessary. The carriage has been open to public inspection on these premises for nearly three months; but, now that we go out daily, strangers are not admitted on any account, as it would interfere too much with the regular business of the establishment, and also with the progress of the other carriages. [*Ibid.*

Preserving Fruit without Sugar.

Sir,—In the year 1808, (twenty-five years ago,) I received a premium from the Society of Arts for a method of preserving fruit without sugar, the particulars of which was published in the twenty-sixth volume of their Transactions; but as their publications seldom extend beyond the subscribing members, I have made some extracts from the method laid down, for the purpose of a more extended public benefit, by submitting them to the readers of your magazine.

From the experience I have had in bottling fruits in the manner laid down, I have no doubt but they will keep perfectly good for many centuries, as the Society have in their museum some of the samples of fruit twenty-six years old, and I have some gooseberries by me twenty-five years old, and which appear to be as perfect and good as they were before they were bottled.

Thomas Saddington.

Process for preserving Fruit.

The bottles I chiefly use for small fruit, such as gooseberries, currents, cherries, and rapsberries, are selected from the widest necked of those used for wine or porter. Having got them properly cleaned and the fruit ready picked, (which should not be too ripe,) fill such of them as you intend doing at one time as full as they will hold, so as to admit the cork going in, frequently shaking the fruit down whilst filling; when done fit the corks to each bottle, and stick them lightly in, so as to be easily taken out when the fruit is sufficiently scalded, which may be done either in a copper or large kettle, over the fire, first putting a coarse cloth of any sort at the bottom to prevent the heat of the fire from cracking the bottles: then fill the copper or kettle with cold water sufficiently high for the bottles to be nearly up to the top of the neck in it; put them in sideways to expel the air contained in the cavity under the bottom of the bottle; then light the fire if the copper is used, taking care that the bottles do not touch the bottom or sides, which would endanger their bursting, and increase the heat gradually until it comes to about 160 or 170 degrees by a brewing thermometer, which generally requires about three quarters of an hour. For want of such an instrument it may be very well managed by judging of the degree of heat by the finger, which may be known by the water feeling very hot, but not so as to scald it. When it arrives at a sufficient degree of heat, it must be kept at the same for about half an hour longer, which will at all times be quite enough. During the time the bottles are increasing in heat, a tea-kettle full of water must be got ready to boil; as soon as the fruit is properly scalded, take the bottles out of the water one at a time, and fill them within an inch of the cork, with the boiling water out of the tea-kettle. Cork them down immediately, doing it gently, but very tight, by squeezing the cork in; tie the cork down, and lay the bottles on their sides, as by that means the cork keeps swelled, always observing to let them lie on their sides until wanted for use. During the first

month or two after they are bottled, it will be necessary to turn the bottles a little round once or twice in a week, to prevent the fermentation that will arise on some fruits from forming into a crust, by which proper attention the fruit will be kept moist with the water, and no mould will take place. It will also be proper to turn the bottles a little round, occasionally, afterwards. This manner of preserving fruit will be found particularly useful on shipboard for sea stores, as the fruit is not likely to be injured by the motion of the ship when the bottles are laid down on their sides, and the corks kept moist by the liquor, but on the contrary will keep well even in hot climates.

The following sorts of fruit, as samples, were sent for examination, and approved of by the Society of Arts, viz. apricots, rhubarb (peeled and cut into square pieces,) gooseberries, currants, raspberries, cherries, plums, Orleans plums, egg plums, damsons, Siberian crabs, and green gages. [*Ibid.*

Expeditious method of dissolving Amber and Copal.

Sir,—After numerous trials I have at length succeeded in making a saturated solution of amber and copal in spirits of wine and oil of turpentine, without the addition of any foreign substances. I have tried the methods described by Tingry, Varley, &c., but with common turpentine they will not succeed. Tingry's requires no less a period that six months. The plan I pursue is as follows—take a piece of glass tube about four inches long, one-half inch in diameter, and one-tenth inch thick; close up one end and then introduce a few small pieces of amber or copal, and fill the tube about half full of alcohol, specific gravity ·790 (I have not tried a weaker spirit;) close now the upper end with the blow-pipe, and hold it, by means of a wire twisted round it, over a clear fire. The spirit will presently disappear, and the tube be filled with a dense vapour; it may then be removed from the fire, when the vapours will be seen to condense all at once into a colourless fluid, which will turn yellow as it cools. When copal is operated upon it appears quite opaque when the tube is full of vapour, but recovers its transparency as it cools. When the tubes are opened there is no escape of elastic fluid, and if the solutions are poured on a plate of warm glass they will flow into beautiful transparent varnishes. The amber will, no doubt, form an excellent varnish for electrical purposes. When oil of turpentine is used, it appears to expand so as nearly to fill the tube; when poured out it was nearly colourless, and dried almost as fast as spirit varnish. I need scarcely add, that the hand should be protected by a glove, and the face with a plate of glass, or a board with a hole in the centre. To make varnish in the large way, a Papin's digester should be used, and the heat may be regulated by laying the amber, or copal, on the cover; when they melt, the heat may be judged high enough, as copal applied to the outside of the tube readily melted after it had been removed from the fire some time. G. Dakin.

[*Ibid.*

¶ POPULAR SCIENCE.

No. V.

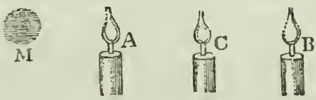
On the Colours of Fibres and Grooved Surfaces.

When we look at a candle, or any other luminous body, through a plate of glass covered with vapour or with dust in a finely divided state, it is surrounded with a corona or ring of colours, like a halo round the sun or moon. These rings increase as the size of the particles which produce them is diminished; and their brilliancy and number depend on the uniform size of these particles. Minute fibres, such as those of silk and wool, produce the same series of rings, which increase as the diameter of the fibres is less; and hence Dr. Young proposed an instrument called an *eriometer*, for measuring the diameters of minute particles and fibres, by ascertaining the diameter of any one of the series of rings which they produce.

By observing the colours produced by reflexion from the fibres which compose the crystalline lenses of the eyes of fishes and other animals, I have been able to trace these fibres to their origin, and to determine the number of poles or septa to which they are related. The same mode of observation, and the measurement of the distance of the first coloured image from the white image, has enabled me to determine the diameters of the fibres, and to prove that they all taper like needles, diminishing gradually from the equator to the poles of the lens, so as to allow them to pack into a spherical superficies as they converge to their poles or points of origin. These coloured images, produced by the fibres of the lens, lie in a line perpendicular to the direction of the fibres, and by taking an impression on wax from an indurated lens, the colours are communicated to the wax. In several lenses I observed coloured images at a great distance from the common image, but lying in a direction coincident with that of the fibres; and from this I inferred, that the fibres were crossed by joints or lines, whose distance were so small as the 11,000th part of an inch; and I have lately found, by the use of very powerful microscopes, that each fibre has in this case teeth like those of a rack, of extreme minuteness, the colours being produced by the lines which form the sides of each tooth.

In the same class of phenomena we must rank the principal colours of mother-of-pearl. This substance, obtained from the shell of the pearl oyster, has been long employed in the arts, and the fine play of its colours is therefore well known. In order to observe its colours, take a plate of regularly formed mother-of-pearl, with its surfaces nearly parallel, and grind these surfaces upon a hone or upon a plate of glass, with the powder of schistus, till the image of a candle reflected from the surfaces is of a dull reddish-white colour. If we now place the eye near the plate, and look at this reflected image, C, we shall see on one side of it a prismatic image, A, glowing with all the colours of the rainbow, and forming, indeed a spectrum of the candle as distinct as if it had been formed by an equilateral prism of flint glass. The blue side of this image is next the image C.

On the outside of the image A there is invariably seen a mass, M, of coloured light, whose distance MC is nearly double AC. These three images are always nearly in a straight line, but the angular distance of M varies with the angle of incidence according to a law different from that of A. At great angles of incidence the nebulous mass is of a beautiful crimson colour; at an angle of about 37° it becomes green; and nearer the perpendicular it becomes yellowish white, and very luminous.



If we now polish the surface of the mother-of-pearl, the ordinary image C will become brighter and quite white, but a *second prismatic image*, B, *will start up on the other side of* C, *and at the same distance from it.*

This second image has in all other respects the same properties as the first. Its brightness increases with the polish of the surface, till it is nearly equal to that of A, the lustre of which is slightly impaired by polishing. This second image is never accompanied, like the first, with a nebulous mass M. If we remove the polish, the image B vanishes, and A resumes its brilliancy. The lustre of the nebulous mass M, is improved by polishing.

If we repeat these experiments on the *opposite* side of the specimen, the very same phenomena will be observed, with this difference only, that the images A and M are on the opposite side of C.

In looking through the mother-of-pearl when ground extremely thin, nearly the same phenomena will be observed. The colours and distances of the images are the same, but the nebulous mass, M, is never seen by transmission. When the second image, B, is invisible by reflexion, it is exceedingly bright when seen by transmission, and vice versa.

In making these experiments I had occasion to fix the mother-of-pearl to a goniometer with a cement of rosin and beeswax; and upon removing it I was surprised to see the whole surface of the wax shining with the prismatic colours of the mother-of-pearl. I at first thought that a small film of the substance had been left upon the wax, but this was soon found to be a mistake, and it became manifest that the mother-of-pearl really impressed upon the cement its own power of producing the coloured spectra. When the unpolished mother-of-pearl was impressed on the wax, the wax gave only one image, A; and when the polished surface was used, it gave both A and B, but the nebulous image M was never exhibited by the wax. The images seen in the wax are always on the opposite side of C, from what they are in the surface that is impressed upon it.

The colours of mother-of-pearl, as communicated to a soft surface, may be best seen by using black wax; but I have transferred them

also to balsam of Tolu, realgar, fusible metal, and to clean surfaces of lead and tin by hard pressure, or the blow of a hammer. A solution of gum arabic or of isinglass, when allowed to indurate upon a surface of mother-of-pearl, takes a most perfect impression from it, and exhibits all the communicable colours in the finest manner, when seen either by reflexion or transmission. By placing the isinglass between two finely polished surfaces of good specimens of mother-of-pearl, we shall obtain a film of artificial mother-of-pearl, which when seen by single lights, such as that of a candle, or by an aperture in the window, will shine with the brightest hues.

If, in this experiment, we could make the grooves of the one surface of mother-of-pearl exactly parallel to the grooves in the other, as in the shell itself, the images, A and B, formed by each surface would coincide, and only two would be observed by transmission and reflexion: but as this cannot be done, *four images* are seen through the isinglass film, and also four by reflexion; the two new ones being formed by reflection from the second surface of the film.

From these experiments it is obvious that the colours under our consideration are produced by a particular configuration of surface, which, like a seal, can convey a reverse impression of itself to any substance capable of receiving it. By examining this surface with microscopes, I discovered in almost every specimen a grooved structure, like the delicate texture of the skin at the top of an infant's finger, or like the section of the annual growths of wood, as seen upon a dressed plank of fir. These may sometimes be seen by the naked eye, but they are often so minute that 3000 of them are contained in an inch. The direction of the grooves is always at right angles to the line MACB, fig. 62; and hence in irregularly formed mother-of-pearl where the grooves are often circular, and having every possible direction, the coloured images A B are irregularly scattered round the common image C. If the grooves were, accordingly, circular, the series of prismatic images A B, would form a prismatic ring round C, provided the grooves retained the same distance. The general distance of the grooves is from the 200th to the 5000th of an inch, and the distance of the prismatic images from C increases as the grooves become closer.

These grooves are obviously the sections of all the concentric strata of the shell. When we use the actual surface of any stratum, none of the colours A B are seen, and we observe only the mass of nebulous light M occupying the place of the principal image C. Hence we see the reason why the *pearl* gives none of the images A B, why it communicates none of its colours to wax, and why it shines with that delicate white light which gives it all its value. The pearl is formed of concentric spherical strata, round a central nucleus, which Sir Everard Home conceives to be one of the ova of the fish. None of the edges of its strata are visible, and as the strata have parallel surfaces, the mass of light M is reflected exactly like the image C, and occupies its place; whereas, in the mother-of-pearl it is reflected from surfaces of the strata, inclined to the general surface of the specimen which reflects the image C. The mixture of all these diffused

masses of nebulous light, of a pink and green hue, constitutes the beautiful white of the pearls. In bad pearls, where the colours are too blue or too pink, one or other of these colours has predominated. If we make an oblique section of a pearl, so as to exhibit a sufficient number of concentric strata, with their edges tolerably close, we should observe all the communicable colours of mother-of-pearl.*

These phenomena may be observed in many other shells besides that of the pearl oyster; and in every case we may distinguish communicable from incommunicable colours, by placing a film of fluid or cement between the surface and a plate of glass. The communicable colours will all disappear from the filling up of the grooves, and the incommunicable colours will be rendered more brilliant.

The principle of the production of colour by grooved surfaces, and of the communicability of these colours, by pressure, to various substances, has been happily applied to the arts by John Barton, Esq. By means of a delicate engine, operated by a screw of the most accurate workmanship, he has succeeded in cutting grooves upon steel at the distance of from 2000th to the 10,000th of an inch. These lines are cut with the point of a diamond, and such is their perfect parallelism and the uniformity of their distance, that while in mother-of-pearl we see only one prismatic image, A, on each side of the common image C, of the candle, in the grooved steel surfaces six, seven, or eight prismatic images are seen, consisting of spectra as perfect as those produced by the finest prisms. Nothing in nature or in art can surpass this brilliant display of colours; and Mr. Barton conceived the idea of forming buttons for gentlemen's dress, and articles of female ornament covered with grooves, beautifully arranged in patterns, and shining in the light of candles or lamps with all the hues of the spectrum. To these he gave the appropriate name of *Iris* ornaments. In forming the buttons the patterns were drawn on steel dies, and these, when duly hardened, were used to stamp their impressions upon polished buttons of brass. In day-light the colours on these buttons are not easily distinguished, unless when the surface reflects the margin of a dark object seen against a light one; but in the light of the sun, and that of gas flame or candles, these colours are scarcely, if at all, surpassed by the brilliant flashes of the diamond.

The grooves thus made upon steel are, of course, all transferable to wax, isinglass, tin, lead, and other substances; and by indurating thin transparent films of isinglass between two of these grooved surfaces, covered with lines lying in all directions, we obtain a plate which produces, by transmission, the most extraordinary display of prismatic spectra that has ever been exhibited. [*Brewster's Optics.*

Aldini's Fireman's Defence.

In our own times, the art of defending the hands and face, and indeed the whole body, from the action of heated iron and intense fire,

* See Edinburgh Journal of Science, No. XII. p. 277.

has been turned to the noble purpose of saving human life, and rescuing property from the flames. The revival and improvement of this art we owe to the benevolence and ingenuity of the Chevalier Aldini, of Milan, who has travelled through all Europe to present this valuable gift to his species. Sir H. Davy had shown that a safety lamp for illuminating mines containing inflammable air, might be constructed of wire gauze alone, which prevented the flame within, however large or intense, from setting fire to the inflammable air without. This valuable property, which has been long in practical use, he ascribed to the conducting and radiating power of the wire gauze, which carried off the heat of the flame and deprived it of its power. The Chevalier Aldini conceived the idea of applying the same material in combination with other badly conducting substances, as a protection against fire. The incombustible pieces of dress which he uses for the body, arms, and legs are formed out of strong cloth, which has been steeped in a solution of alum, while those for the head, hands, and feet, are made of cloth of asbestos, or amianthus. The head-dress is a large cap which envelops the whole head down to the neck, having suitable perforations for the eyes, nose, and mouth. The stocking and cap are single, but the gloves are made of double amianthus cloth, to enable the fireman to take into his hand burning or red hot bodies. The piece of ancient asbestos cloth preserved in the Vatican was formed, we believe, by mixing the asbestos with other fibrous substances; but M. Aldini has executed a piece of nearly the same size, nine feet five inches long, and five feet three inches wide, which is much stronger than the ancient piece, and possesses superior qualities, in consequence of having been woven without the introduction of any foreign substances. In this manufacture the fibres are prevented from breaking by the action of steam, the cloth is made loose in its fabric, and the threads are about the fiftieth of an inch in diameter.

The metallic dress which is superadded to these means of defence, consists of five principal pieces, viz. a *casque*, or cap, with a mask large enough to leave a proper space between it and the asbestos cap; a cuirass with its brassets; a piece of armour for the trunk and thighs; a pair of boots of double wire gauze; and an oval shield five feet long by two and a half wide, made by stretching the wire gauze over a slender frame of iron. All these pieces are made of iron wire gauze, having the intervals between its threads the twenty-fifth part of an inch.

In order to prove the efficacy of this apparatus, and inspire the firemen with confidence in its protection, he showed them that a finger first enveloped in asbestos, and then in a double case of wire gauze, might be held a long time in the flame of a spirit lamp or candle before the heat became inconvenient. A fireman having his hand within a double asbestos glove, and its palm protected by a piece of asbestos cloth, seized with impunity a large piece of red hot iron, carried it deliberately to the distance of 150 feet, inflamed straw with it, and brought it back again to the furnace. On another occasion, the firemen handled blazing wood and burning substances, and walked during five minutes upon an iron grating placed over flaming faggots.

In order to show how the head, eyes, and lungs are protected, the fireman put on the asbestos and wire gauze cap, and the cuirass, and held the shield before his breast. A fire of shavings was then lighted, and kept burning in a large raised chaffing-dish, and the fireman plunged his head into the middle of the flames, with his face to the fuel, and in that position went several times round the chaffing-dish, for a period longer than a minute. In a subsequent trial at Paris, a fireman placed his head in the middle of a large brazier filled with flaming hay and wood, as in the annexed figure, and resisted the action of the fire during five or six, and even ten, minutes.

In the experiments which were made at Paris in presence of a committee of the Academy of Sciences, two parallel rows of straw and brushwood, supported by iron wires, were formed at the distance of three feet from each other, and extended thirty feet in length. When this combustible mass was set on fire, it was necessary to stand at the distance of eight or ten yards to avoid the heat. The flames from both the rows seemed to fill up the whole space between them, and rose to the height of nine or ten feet. At this moment, six firemen, clothed in incombustible dresses, and marching at a slow pace behind each other, repeatedly passed through the whole length between the two rows of flame, which were constantly fed with additional combustibles. One of the firemen carried on his back a child eight years old in a wicker basket, covered with metallic gauze, and the child had no other dress than a cap made of amianthine cloth.

In February, 1829, a still more striking experiment was made in the yard of the barracks of St. Gervais. Two towers were erected two stories high, and were surrouded with heaps of inflammable materials, consisting of faggots and straw. The firemen braved the danger with impunity. In opposition to the advice of M. Aldini, one of them, with the basket and child rushed into a narrow place, where

the flames were raging eight yards high. The violence of the fire was so great that he could not be seen, while a thick black smoke spread around, throwing out a heat which was unsupportable by the spectators. The fireman remained so long invisible that serious doubts were entertained of his safety. He at length, however, issued from the fiery gulf uninjured, and proud of having succeeded in braving so great a danger.

It is a remarkable result of these experiments, that the firemen are able to breath without difficulty in the middle of the flames. This effect is owing not only to the heat being intercepted by the wire gauze as it passes to the lungs, in consequence of which its temperature becomes supportable, but also to the singular power which the body possesses of resisting great heats, and of breathing air of high temperatures. [*Brewster's Natural Magic.*

Meteorological Observations for June, 1833.

Moon.	Days.	Therm.		Barometer.		Dew point	Wind.		Water fallen in rain.	State of the weather, and Remarks.
		Sun rise.	2 P.M.	Sun rise.	2 P.M.		Direction.	Force.		
				Inches	Inches.				Inches.	
	1	58°	77°	29.95	30.00	61°	W.	Moderate.		Flying clouds—clear.
☉	2	62	84	.90	29.80	68	S.	Brisk.	0.05	Rain—flying clouds.
	3	62	80	.70	.70	57	S.	do.		Cloudy—flying clouds.
	4	46	71	30.00	30.05	39	NW.	Moderate.		Clear day.
	5	50	74	.10	.10	38	W.	do.		Clear day.
	6	60	62	.00	29.83	64	W. SE.	do.		Cloudy—rain.
	7	58	62	29.70	.70	60	SE.	do.	2.02	Rain—drizzle.
	8	60	64	.70	.70	60	W.	do.		Drizzle—cloudy.
	9	57	71	.60	.60	46	W.	Brisk.		Cloudy—clear.
☽	10	47	70	.60	.60	45	W.	Moderate.		Clear day.
	11	48	68	.55	.60	45	W.	do.		Clear day.
	12	50	71	.80	.83	45	W.	do.		Clear day.
	13	60	84	.85	.80	68	W.	do.	0.26	Flying cldous: clear: thunder [shower.
	14	66	72	.70	.70	58	W.	Brisk.		Flying clouds—do.
	15	62	80	.70	.70	58	W.	do.		Clear—flying clouds.
	16	64	78	.64	.64	48	W.	do.		Clear day.
⊗	17	58	76	.65	.70	46	W.	do.		Lightly cloudy—clear.
	18	56	75	.90	30.00	47	W.	do.		Light clouds—clear.
	19	52	70	30.04	.04	57	SE. S.	Moderate.		Fog—cloudy—rain.
	20	54	64	29.90	29.90	64	SE. SW.	Brisk.		Cloudy—rain.
	21	66	68	.90	.90	61	W.	Moderate.	3.98	Rainy day.
	22	64	84	.85	.85	65	W. SE.	do.		Clear day.
	23	64	83	.85	.85	56	SE.	do.		Clear day.
☾	24	66	78	.70	.60	65	NW.	do.	0.95	Lightly cloudy—rain.
	25	56	68	.55	.55	46	W.	Brisk.		Clear day.
	26	56	65	.60	.60	54	NW.	Moderate.	0.20	Rain—flying clouds.
	27	55	74	.75	.85	47	SE.	do.		Clear day.
	28	64	72	.95	.95	49	W.	do.		Fog—cloudy.
	29	64	76	30.00	30.00	52	NW.	do.		Fog—cloudy.
	30	58	79	.05	.05	59	NW.	do.		Clear day.
										Clear day.
	Mean	58.10	73.33	29.80	29.80	51.3			7.46	

		Thermometer.	Barometer.
Maximum height during the month,		84. on 2nd, 13th, 22nd.	30.10 on 5th.
Minimum	do. . . .	40. on 4th.	29.55 on 11th and 25th.
Mean	do. . . .	65.71 . .	29.80

JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

SEPTEMBER, 1833.

The Pennsylvania Locomotive.

Communicated for this Journal.

Patents have been granted to Colonel Long, of the United States Army, for "certain improvements in the construction of locomotive and other steam engines," under the designation with which this article is headed. The numerous experiments which have been made by Col. Long, with the view of perfecting, and satisfactorily testing the efficiency of his improvements, have been attended with great expense, and have led to the most satisfactory results.

In this communication it is intended to explain some of the more prominent objects of Col. Long's improvements, and to conclude with a brief recital of some of the practical results accomplished by them.

1st. The successful application of anthracite coal as a fuel for locomotive engines, has been a leading object of the inventor. This object has been attained in the most satisfactory manner, by means of a furnace and boilers of a peculiar construction. The furnace is surrounded by water on all sides, in a manner similar to that adopted in the most approved English locomotive engines, but differs from the latter in the manner of attaching the fire box to the boilers, and in exposing a much larger comparative boiler surface to the direct action of the heat. The furnace is supplied with a grate of a peculiar construction, which may be made to oscillate at pleasure, on an axle provided for that purpose. By means of the movements thus communicated, the fuel may be speedily discharged from the fireplace, when-

ever occasion requires it; or may be shaken or agitated in such a manner as to prevent the coal from packing upon the grate bars, and thereby obstructing the requisite draft into the flues and chimney.

In addition to the fire box already mentioned, the boiler, or steam generator, consists of two or more cylindrical boilers placed horizontally and lengthwise of the engine. Each cylindrical boiler is furnished with tubular flues passing longitudinally through that portion of the boiler situated in rear of the fireplace. The heated air, flame, &c. is admitted into these flues through a niche in the cylinder prepared for this purpose, and is conducted through them into a smoke box and chimney situated at the back end of the boiler.

In addition to the tubular flues just mentioned, there is a broad and sufficiently copious flue situated beneath the cylindrical boilers, by means of which the heated air, &c. is brought into contact with the entire lower half, or exterior, of all the cylindrical boilers.

The very extensive boiler surface thus acquired and presented to the action of the heat, contributes to render the production of steam exceedingly copious, while the heat imparted by the fuel, is almost entirely absorbed in its production. Such is the efficiency of this arrangement, that in a boiler nine feet and eight inches long, with two cylindrical boilers, each twenty inches in diameter, embraced within that length, the whole weighing, inclusive of all the flues, three thousand pounds, two hundred gallons of water have been evaporated in an hour, under a pressure of ninety pounds to the square inch, and at the expense of two bushels of anthracite coal.

In order to facilitate the combustion, or rather the ignition of the coal, a slip chimney has been introduced into the engine, by means of which the height of the chimney may be varied at pleasure, from fourteen to twenty feet.

Among the advantages expected to result from this method of constructing boilers, are the exposure of a much larger comparative surface to the action of the heat; a very great reduction of the quantity, or weight, of the water necessary to a minimum supply in the boilers; a similar reduction in the weight of the boilers, as also in the thickness of the metal of which they are composed; together with certain facilities hereafter to be noticed, for removing, renewing, and replacing the boilers, without deranging other parts of the engine.

2nd. The steam is employed in the working cylinders in such a manner as will allow of its operating, not only by its absolute, but by its expansive force. This object is effected by means of certain adjustments in the steam valve apparatus, by the aid of which the entrance of the steam into each of the working cylinders, is interrupted, at about five eighths of the stroke of the piston. The advantages of such an arrangement are too obvious to require a particular designation. It is sufficient to remark, that by this means, three-fifths of the steam generated, are rendered quite as efficient as the whole would be without such an arrangement.

3d. The adoption of wooden wheels bound with wrought iron, and of such a construction as will admit of tightening the tire, or other-

wise repairing it, without materially affecting the relations between the centres and peripheries of the wheels.

It is obvious to any one acquainted with the nature of the materials employed in the construction of wheels, that the iron bands, or tires, of wooden wheels, will expand and contract by the ordinary changes in the temperature of any climate, in such a manner, and to such an extent, as will, sooner or later, render the tire loose upon the felloes. In the wheels of the Pennsylvania locomotive, such a defect is readily remedied by withdrawing the flange tire and inserting thin iron wedges between the remaining tire and the felloes, without the hazard of producing eccentricity in the wheel.

4th. The construction and application of boxes or bearings for the wheels, or between the carriage frame and the axles, which not only serve as *steps* for the bearing journals of the axles, but as receptacles for the grease, oil, or unguent, necessary for their lubrication. The boxes are of the best hard brass, and are, moreover, adjusted to *bosses* attached to the axle in such a manner as to obviate the use of linch-pins, or other apparatus, to confine the axles in their bearing.

5th. The construction of a carriage frame, in a manner to afford the requisite stiffness in the engine, without the necessity of firm and substantial attachments to the boiler, as a means of imparting this essential property to the engine.

It must be manifest to every one conversant with steam engines, that the ordinary or rather extraordinary strain produced in boilers by the expansive force of high steam, is all that they ought to be compelled to resist. If to this great strain, that attendant on the concussions of a heavy engine in rapid motion, be added, the liability to explosion is greatly increased, while at the same time, rents and fissures in the joinings of the boilers, of a character seriously to injure the engine, and impair its efficiency, are likely to occur.

The only remedy hitherto devised to correct this difficulty, has been found in increasing the thickness of the metal composing the boilers, which must of course add proportionately to the weight of the engine, without increasing its efficiency. The evil here adverted to, has been far more advantageously remedied in the Pennsylvania locomotive in the way just suggested, viz. by giving to the engine the requisite stiffness without depending on attachments to the boiler for the attainment of this object.

The boilers, instead of being firmly connected with the frame, are merely suspended within it by the introduction of springs, whereby they are exempt from the violent shocks to which other parts of the engine are occasionally exposed. By means of this arrangement, also, the working parts of the engine are relieved from the vibrations and other irregularities calculated to impair the efficiency, and injure those parts of the engine affected by such irregularities.

6th. Lightness in the construction of locomotive engines has been regarded as a leading object of this invention. This object, it is believed, has elicited far less attention from those concerned in railroads than it deserves, especially when viewed in connexion with rapid transportation. Strong objections have repeatedly been urged

against the employment of light engines, on the ground of their not having sufficient adhesion to the rails, to prevent the wheels from slipping. In reply to such objections, it is proper to observe, that it is very seldom that a gross load weighing more than thirty tons, including passengers, baggage, and cars, is ever offered for rapid conveyance, and that an engine weighing only three tons, has sufficient adhesion to convey such a load, even on a road slightly ascending.

In view of the solidity and texture of the materials of which engines must be composed, it is confidently believed that the greatest economical speed for an engine weighing six tons, will not exceed fifteen miles an hour. It is as confidently believed that a greater speed, with an engine of the weight just mentioned, would be attended with serious injury not only to the engine itself, but to the rails and other parts of the road on which it travels. This being admitted, the inference is fair and conclusive, being grounded on the laws of motion, concussion, &c. by which the movements of heavy bodies are governed, that an engine weighing three tons only, and moving at the rate of thirty miles per hour, will be attended with shocks equally severe, and, consequently, that the *wear and tear* of the engine, rails, &c. will be equal in both cases. Hence if a speed of thirty miles per hour must be attained, the weight of the engine ought not to exceed three tons. This may be regarded by some, as a mere matter of assumption, yet facts may be adduced, of a character to corroborate and enforce such a conclusion.

Having given the foregoing explanations touching the objects aimed at in the construction of the Pennsylvania locomotive, the writer will conclude his remarks for the present, by recording a few of the general results drawn from numerous and repeated trials of this engine, on the rail-road leading from Philadelphia to Germantown.

The extent of this road between the two places above mentioned, is six and a half miles. Its ascent from the depot, in Ninth street, to its termination in Germantown, is 207 feet, or a little more than thirty feet per mile. The steepest ascent, is at the rate of forty-five feet per mile, which occurs in a distance of about half a mile, in Germantown. The road is exceedingly crooked, and the evenness of its surface is much impaired by the settling of embankments, and the consequent derangement of the rail-tracks. The number of trips, outward and returning, performed by the engine, is about eighty, the whole of which were attended with similar results. In no instance has a trip been interrupted for want of sufficient steam; on the contrary, at almost every trip, the fire door has been thrown open a part of the time, in order to prevent the generation of more steam than could be used.

The only fuel employed was anthracite coal. The quantity consumed in running to Germantown and back again, did not exceed two bushels. The quantity of water evaporated under a pressure of eighty to ninety pounds per square inch, was about 200 gallons per trip. The engine has repeatedly started with a fresh charge of coal in the furnace, and with a pressure of steam barely sufficient to put the train in motion, yet, on reaching a distance of three or four miles,

on an ascending trip, while the train was moving at its greatest speed, the steam was generated in such profusion, as to force open both safety valves at once.

The results that will now be noticed, all of which relate to ascending or outward trips only, are as follows, viz.—

Three passenger cars, with fifty passengers, were drawn the entire distance in twenty-eight minutes, including two stoppages on account of way passengers.

Three passenger cars, with sixty-nine passengers, were drawn through the same distance in twenty-six minutes, including four stoppages as above.

Three passenger cars, with 124 passengers, were drawn, as above, in twenty-nine minutes, including three stoppages as before.

Two passenger cars were drawn, as above, in nineteen minutes, the number of passengers being forty.

To these may be added the two following trials, with burthen cars:—

A gross load of eleven and a half tons, was conveyed to Germantown, in twenty-six minutes.

Six burthen cars, each weighing $28\frac{1}{4}$ cwt., three of the cars being loaded with stones, gross load, by estimate, twenty-five tons, were conveyed upward on the steepest and most crooked part of the road, the ascent on a part of the distance being at the rate of forty-five feet per mile, at a speed, as nearly as the engineer could judge, of at least twelve miles per hour.

On the 4th of July, six trips were made, each with three cars attached. Average time of ascent twenty-five minutes; average number of passengers conveyed, between sixty and seventy.

By a fair comparison with the results of other engines plying on the same road, and propelled by the use of pine wood for fuel,—the cost of coal required to perform a given service, does not exceed one-half that of pine wood for a similar performance,—two bushels of the former being of equal efficiency with one-fourth of a cord of the latter.

There is still another consideration which entitles anthracite coal to a decided preference before pine wood, or any other fuel employed in locomotive engines, which is that, in the use of the former, passengers are entirely exempt from the annoyance of smoke, sparks, cinders, &c. which are produced and thrown out in great profusion when other kinds of fuel are employed.

* * *

Girard College.

The corner stone of this institution was laid on the 4th of July last, and the labours preparatory to the erection of the superstructure are now going on. The subject of general education is one in which we take an intense interest, and we rejoice to witness the increasing the wide-spreading conviction of its importance, and its absolute necessity to the full development and the perpetuation of our

free institutions. The splendid bequest of the late Stephen Girard is an event characteristic of the spirit of the age, and we confidently hope that it will mark a most important era in the annals of education. We consider the notice of such an event as peculiarly appropriate to the pages of a journal devoted to the promotion of the useful arts, and the diffusion of general science, and shall therefore take other opportunities of adverting to it. Our design on the present occasion is merely to write a few lines prefatory to the admirable address of the Chairman of the Board of Trustees, delivered at the time of laying the corner stone of the intended edifice. It is our wish to give to this address a more permanent form that that which it would receive from its general publication in the daily journals. Its literary merits alone would fully justify this procedure, but apart from this consideration, there are many others which, in our opinion, urge its insertion; of these we will now mention only one, which is the view that it takes of the character of Stephen Girard. Believing, as we do, that this view is a perfectly correct one, and metes to him that perfect justice which some persons have manifested a disposition to withhold, we are desirous of aiding in the diffusion of a paper which we believe is destined to give a fixed tone to the public sentiment on this point.

EDITOR.

ADDRESS,

By NICHOLAS BIDDLE, ESQ.

Chairman of the Trustees of the Girard College for Orphans; pronounced by request of the Building committee, on the occasion of laying the corner-stone of the edifice, July 4th, 1833.

FELLOW CITIZENS,—We have now witnessed the laying of the corner stone of the Girard College for orphans. That stone, simple, massive, and enduring, the fit emblem of the structure to be reared from it, and of the man whose name it bears, has been deposited in its final resting place—the earth received it—to-morrow the earth will cover it. Ours are the last eyes which shall look upon it, and hereafter it will lie in its silent repose, unmoved by all the revolutions of the changing world above it.

And yet from out that depth is to rise the spirit which may more influence the destiny of ourselves and our children, than all else the world now contains. The seed that has been planted is of the tree of knowledge—that growth which gives to existence all that renders it attractive—flowers for our early youth—fruits in maturer life—and shelter for declining years. It is that knowledge which, trampling down in its progress the dominion of brutal force, and giving to intellect its just ascendency, has at length become the master power of the world. No people can now be distinguished or prosperous, or truly great, but by the diffusion of knowledge—and in the stirring competition of the roused spirits of our time, the first glory, and the highest success, must be assigned to the best educated nation. If this be true in our relations abroad, it is far more true at home. Our institutions have boldly ventured to place the whole

power of the country in the hands of the people at large, freed from all the great restraints which in other countries were deemed necessary. In doing this, their reliance is entirely on the general intelligence and education of the community, without which such institutions could have neither permanence nor value. Their brilliant success has hitherto justified that confidence, but as our population becomes concentrated into denser masses, with more excited passions and keener wants, the corrective influence of instruction becomes daily more essential. The education then of the people, which elsewhere is desirable or useful, becomes with us essential to the enjoyment as well as to the safety of our institutions. Our general equality of rights would be unavailing without the intelligence to understand and to defend them—our general equality of power would be dangerous if it enabled an ignorant mass to triumph by numerical force over the superior intelligence which it evinced—our universal right to political distinction, unless the people are qualified for it by education, becomes a mere abstraction, exciting only an abortive ambition. While, therefore, to be uneducated and ignorant, is in other countries a private misfortune, in ours it is a public wrong; and the great object to which statesmen should direct their efforts is to elevate the standard of public instruction to the level, the high table land, of our institutions. It is thus that this day has been appropriately chosen for the present solemnity.

It is fit that the anniversary of that day when our ancestors laid the broad foundations of our public liberties—on that day when our countrymen, throughout this prosperous empire, are enjoying the blessings which these institutions confer, we, in our sphere of duty, should commence this great work which is so eminently adapted to secure and perpetuate them.

Of this truth no man had a deeper conviction than our distinguished fellow citizen, whose history, and whose design in founding this institution, may aptly occupy for a few moments, our attention.

Of these, now that the tomb has dissipated all the illusions which once surrounded them, we can speak with the impartiality of history; and here on this chosen spot, the scene of his future fame, we may freely bestow on his memory, the homage which his unassuming nature would have shunned while living.

We all remember, and most of us knew him;—Plain in appearance, simple in manners, frugal in all his habits, his long life was one unbroken succession of intense and untiring industry; wealthy, yet without indulging in the ordinary luxuries which wealth may procure —a stranger to the social circle—indifferent to political distinction—with no apparent enjoyment except in impelling and regulating the multiplied occupations of which he was the centre,—whose very relaxation was only variety of labour, he passed from youth to manhood, and finally to extreme old age, the same unchanged, unvarying model of judicious and successful enterprise. At length, men began to gaze with wonder on this mysterious being, who, without any of the ordinary stimulants to exertion, urged by neither his own wants, nor the wants of others,—with riches already beyond the hopes of avarice,

yet persevered in this unceasing scheme of accumulation, and, possessing so much, strove to possess more as anxiously as if he possessed nothing. They did not know that under that cold exterior, and aloof in the stern solitude of his mind, with all that seeming indifference to the world and to the world's opinions, he yet felt the deepest sympathy for human affliction, and nursed a stronger, yet a far nobler and wiser ambition to benefit mankind, than ever animated the most devoted follower of that world's applause. His death first revealed that all this accumulation of his laborious and prolonged existence was to be the inheritance of us and of our children,—that for our and their comfort, the city of his adoption was to be improved and embellished, and above all, that for their advancement in science and in morals, were to be dedicated the fruits of his long years of toil.

It required the self-denial of no common mind, to resist the temptation of being himself the witness and the administrator of this bounty, and to have abstained from enjoying the applause of his grateful countrymen, who would have acknowledged with affectionate respect, the benefits which they derived from him. Yet even this secret and prospective munificence, must have had its charm for a mind like his, and we may well imagine that the deep and retired stillness of his spirit, was often soothed with the visions of the lasting good, and perhaps, too, of the posthumous glory, which he was preparing. Such contemplations he might well indulge, for to few have they been so fully realized. From the moment that foundation stone touched the earth, the name of Girard was beyond the reach of oblivion. From this hour, that name is destined to survive to the latest posterity, and while letters and the arts exist, he will be cited as the man who with a generous spirit and a sagacious foresight, bequeathed for the improvement of his fellow men, the accumulated earnings of his life. He will be remembered in all future times by the emphatic title with which he chooses to be designated, and with which he commences his will—a title by which we ourselves may proudly recognise him as "Stephen Girard, of the city of Philadelphia, and commonwealth of Pennsylvania, merchant and mariner"—the author of a more munificent act of enlightened charity than was ever performed by any other human being.

His will indeed be the most durable basis of all human distinction —a wise benevolence in the cause of letters. The ordinary charity which feeds or clothes the distressed, estimable as it is, relieves only the physical wants of the sufferer. But the enlightened beneficence which looks deeper into the wants of our nature—which not merely prolongs existence, but renders that existence a blessing, by pouring into these recesses of sorrow, the radiance of moral and intellectual cultivation—this it is which forms the world's truest benefactor, and confers the most enduring of all fame. His glory is the more secure, because the very objects of that benevolence are enabled to repay with fame, the kindness which sustains them.

It is not unreasonable to conjecture that in all future times, there will probably be in existence many thousand men who will owe to

Girard the greatest of all blessings, a virtuous education; men who will have been rescued from want, and perhaps from vice, and armed with power to rise to wealth and distinction. Among them will be found some of the best educated citizens, accomplished scholars, intelligent mechanics, distinguished artists, and the most prominent statesmen. In the midst of their prosperity, such men can never forget the source of it, nor will they ever cease to mingle with their prayers, and to commemorate with their labours, the name of their great benefactor. What human being can be insensible to the happiness of having caused such a succession of good through remote ages, or not feel that such applause is more grateful than all the shouts which ever rose from the bloodiest field of battle, and worth all the vulgar fame of a hundred conquests. Our estimate of its value will be increased by considering the nature and design of this institution.

After the buildings shall have been completed, there will remain for their support the annual income from two millions of dollars, now yielding $102,000, and if these funds should be inadequate for all the orphans applying for admission, the income of nearly all the remainder of the estate is to be appropriated to the erection of as many new buildings as his square in the city would have contained. So that, in general, it may be stated with reasonable confidence, that when all the buildings are ready for the reception of the pupils, there will be available for the maintenance of the institution, an income of not less than one hundred thousand dollars, which may be increased to at least two hundred and twenty thousand dollars.

These ample funds are to be devoted to the maintenance and education of "poor male white orphan children." Of all the classes of human indigence there are none more helpless, and none more entitled to our sympathies, than these children of misfortune. They have lost their natural protectors. The arms which have hitherto embraced and sustained them, have been folded in death. They began life in comfort, perhaps in affluence, but now they stand alone, abandoned and helpless, to struggle against the world's coldness, with precarious means of subsistence, with no means of instruction, and treading on that narrow and slippery verge which too often alone separates want from crime. From this friendless condition they are rescued by the benevolence of Girard, who not merely provides the means of subsistence, but redressing the wrongs of fortune, raises them at once in the scale of beings, and qualifies them at once to be useful members of that society which they would otherwise disturb, or corrupt.

How wide the limits of that benevolence may be, it is impossible to conjecture. If the imperfection of language suggests a doubt as to the degree of destitution which makes "an orphan," the greater weakness of our nature forces upon us the melancholy inquiry—what child is there who may not be a poor orphan? Who is there indeed among us whose children may not yet need the blessings of this institution? Let none of us, in the confidence of prosperity, deem his own offspring secure. Alas! all our prosperity is so vain and shadowy, and misfortune is so constantly in ambush to assail us, that it were presumptuous in any of us to suppose himself beyond the reach

of vicissitudes, which would render such an institution the happiest refuge for his children. Yes, fellow citizens, this college is our own, the property of us all. It is intended to remedy misfortunes to which we are all equally liable. And it should be a source of great consolation to each of us, that if, in the ever varying turns of human life, misfortune should overtake, and death surprise us, they who bear our names, and are destined to be the fathers of our descendents, will here find a home where they may be prepared for future usefulness, and become in turn the protectors and support of their more helpless relatives.

Hereafter, thanks to the bounty of Girard, every father among us may, on his death bed, enjoy the reflection, that although unprovided with fortune, there is secured to his sons that which is at once the means of fortune, and far better than the amplest fortune without it, a good education. This consideration, if any such incentive were wanting, may serve to stimulate the sense of public duty in those who administer the institution, to render it worthy of their own children.

For this purpose, happily, it is only necessary to fulfil the design of the founder, which provides ample means and expressly enjoins the employment of them, to give every kind of liberal and useful instruction.

[TO BE CONTINUED.]

Observations on some points relating to the Construction of Rail-roads.

By the EDITOR.

The number of rail-roads which are being constructed, and the still greater number which it is proposed to construct in our country, render it specially important that all the information which our short acquaintance with this mode of conveyance has afforded, should be as extensively diffused as possible. The question of the utility of rail-roads for the general conveyance of merchandise and of passengers, may now be considered as settled; but we have much to learn as respects the best mode of constructing them so as to insure their durability, whilst the necessary attention is paid to economy in the first instance. There are but few situations in which rail-roads can be carried to any great extent, without a very large outlay for grading, and for building bridges and culverts; their utility is necessarily so dependent upon their near approach to a level, that but little diminution of their cost is to be anticipated so far as these points are concerned. Not so, however, as regards the kind of rails which it is best to employ, the sort of foundation upon which they should be laid, and the best mode of fastening them so as to insure their permanence. The present notice will be principally confined to one or two points connected with this latter part of the subject.

On the Baltimore and Ohio rail-road, the plate rail has been exclusively used, and the same has been most generally adopted in other places. These iron plates, which are usually about two inches and a

quarter wide, and five-eighths thick, were at first laid upon rails of wood, to which they were securely fastened by nails; it was generally believed, however, that a foundation consisting of sills of granite, or other hard stone, in place of the wooden rail, would, by its permanence, more than repay the extra cost of it in all situations where it could be readily procured; on the road first named it was therefore adopted, after carrying the wooden rails to the quarries where such stone could be obtained. It is believed that not the slightest doubt existed on the minds either of the engineers or the directors, of the superior utility of stone in every respect; and, in conformity with this opinion, many miles have been laid with it, and the iron rails carefully secured thereto. In riding over this road, the moment of passing from the wooden to the stone rails can be at once both heard and felt by the passengers in the car. Upon the wood the sound is less harsh, and the vibration less rapid than upon the unyielding stone, the elasticity of the wooden rail rendering it the most pleasant to ride upon; a mere difference of this kind, however, was not to be considered as presenting any valid objection to the use of a material so permanent as the stone. On a recent visit to Baltimore, where we had an opportunity of conversing with individuals whose talents and interest in the road give value to their opinions, we learned with much regret that the result of the experience which they have had, has led them to a conviction that the stone sills must be abandoned, and string pieces of wood resorted to throughout the route, in consequence of the gradual, but inevitable loosening of the iron rails. This has not arisen from any defect in the method by which the rails were secured to the stone, but from causes which cannot be obviated by any skill or care on the part of the workmen, as it is the result, principally, of the vibration produced by the passage of locomotives and cars upon the rails. However carefully such rails may be laid, the points of contact between them and the stones will be but few, and as these are abraded by the vibration, the rails will have a small degree of play; this evil will necessarily go on increasing, and the heads of the nails will eventually be worn off by it, as has actually happened.

It has been proposed to obviate the foregoing defect by interposing a thin strip of wood, or other yielding material, between the iron rail and the stone; this would no doubt lessen it, but to what extent, must be left to the result of experiment. The loosening of the rail upon the stone is, no doubt, in part due to the expansion and contraction of the former, whilst upon a wooden rail but little sensible effect is produced from this cause, the yielding nature of this material serving to prevent it; the degree in which this expansion and contraction operate in loosening the rail would, however, be but slightly diminished by a thin strip of wood, although it appears to be calculated to remove much of the greater evil, the abrasion.

The portions of a rail-road which pass over the original surface of the soil, are very small; excavation or embankment, to a greater or lesser extent, is necessary almost every where. The laying of stone sills on these embankments, when recently made, has been another source of much difficulty in the construction of rail-roads, as in such

places the earth must necessarily continue to settle for a considerable period of time, not only displacing the sills at their junctures, but likewise affecting the grading, and all the calculations founded thereon. It may not excite surprise that the loosening of the rails upon the stone sills was not foreseen in all its extent; but it is certainly remarkable that the capital error of using stone sills on new made ground, should have been any where committed; yet such has been the case to a considerable extent. To raise these sunken sills, with the rails upon them, is a work of great labour, and one, which in high embankments, it may be necessary to repeat several times. This settling of the earth must take place, whatever be the kind of rail used, but the derangement is much less when the plates are laid on wooden string pieces, and the labour of readjustment may be performed with much greater ease.

We have recently travelled along the rail-road leading from Philadelphia to Germantown, and also on the Pennsylvania rail-road, now in the course of construction between Philadelphia and Columbia on the Susquehanna. On the whole of the former, and on a large portion of the latter, the rolled iron edge rail has been adopted. The general plan of forming the foundation of these rails is to sink stone blocks, (each containing about two cubic feet,) at the distance of about three feet from each other, and upon these blocks to fasten cast iron chairs, which receive the lower edges of the rails, and into which they are fastened by suitable wedges. The want of stability in these blocks is already manifest in both these roads, although they are not yet completed, and upon one of them, the Pennsylvania road, locomotive engines have not yet run. The blocks have in some places sunk so as to render the line of the rail undulating to such an extent as to be visible while passing along it. The same circumstances which produce the sinking of the stone sills must operate with equal or greater force in the case of the blocks and chairs. In some places also the rails have been pressed out, and in one instance, at least, on the Germantown road, the rails were so far separated as to allow the wheels of the locomotive engine to fall between them. The numerous curves on these roads render the rails much more liable to be pressed out than those on straighter roads, as the flanches of the wheels, when the engines and cars are moving at high velocities, bear with a force which is with difficulty resisted against the outer rail of the curve, and especially at the moment of changing from one curve to another, or from a straight track to a curve.

There is an old saying that "once well done, is twice done," and although it is much more easy to point out defects than it is to prescribe adequate remedies, it is a thing of high importance in extensive and costly public works that they should not be disgraced by imperfections in the mode of executing them. Although the comparative novelty of rail-roads as a medium of general intercourse and trade, forbids the supposition that we have yet acquired a knowledge of the best mode of constructing them, this will not serve as an apology for a perseverance in known and manifest error. The abandonment

of three-fourths of the rail-roads which have been projected will not be attended by any actual loss, whilst their imperfect construction will not only disappoint the public expectation, but discourage future undertakings of the kind. The first failure may be the result of inexperience, and be, therefore, altogether pardonable, but when the evil and its cause are evident, the course of procedure ought to be changed, in spite of the prejudices of workmen, or the interest of contractors.

The remedies to be applied to obviate or to lessen the defects which have been referred to must necessarily depend upon the means under the control of the engineer, and will therefore differ in different places. Along a large portion of the line of the Pennsylvania rail-road, locust timber may be readily obtained, and where the embankments are not very high, blocks of this wood might rest upon broken stone on the original surface of the ground, and extend up to the level of the road; and these posts might, when necessary, have ties from one to another across the track, to prevent their spreading. This timber is the most durable known, and the chairs would be readily affixed to it. Long blocks of stone, like the sills upon which rails have been laid, extending across from one rail to the other, and receiving the chairs for the edge rail, would completely prevent their spreading. This expedient has been resorted to in some places on the Germantown road, the long stones having been used at the joints of the rails, and stone blocks in the intermediate parts.

These remarks are intended as mere hints which may in some cases be made useful, or serve as inducements to the competent engineer, to devise better modes of procedure. The mentioning of a *competent engineer*, reminds us of one other point essentially connected with the subject in hand, a remark respecting which shall close the present article. We have some gentlemen in our country to whom the foregoing title may be justly applied, but numbers are so dubbed, who have not the slightest claim to the appellation, and, in not a few instances, the direction of important works has been entrusted to such men because they might be *got cheap.* Real talent in this line is never too highly paid for; but a Board of directors will not unfrequently sacrifice hundreds of thousands, to save a thousand or two of dollars in an annual salary.

The foregoing remarks have been elicited by what we have recently seen and heard, and are committed to paper during the continuance of the tour in which they have been suggested.

FRANKLIN INSTITUTE.

Minutes of the Quarterly Meeting.

The thirty-eighth quarterly meeting of the Institute was held at their Hall, July 18, 1833.

Thomas Fletcher, Vice President, in the chair.

William Hamilton, was appointed Recording Secretary, P. T.

The minutes of the last quarterly meeting were read and approved.

Donations of books were received from Messrs. S. C. Atkinson, R. S. Gilbert, Robert Smith, Col. A. Langworthy, Col. J. G. Watmough, and Petty Vaughan, Esq. of London:

Various specimens of iron ore from Mr. John Wiegand:

A brass model of a screw press from Mr. Adam Ramage:

A specimen of steel made from American iron, on the Brandywine, by P. A. Karthhause, Esq. of Baltimore.

The corresponding secretary laid on the table the various journals which had been received during the last three months, in exchange for the Journal of the Institute.

The chairman of the Board of Managers read the thirty-eighth quarterly report of the Board, which was accepted; and, on motion, referred to the committee on publications, with instructions to publish such parts as they may deem expedient.

The treasurer's report for the quarter ending July 1, 1833, was read and accepted.

Extract from minutes.

THOMAS FLETCHER, Vice President.

WILLIAM HAMILTON, Rec. Sec. P. T.

Quarterly Report of the Board of Managers.

In compliance with the requisitions of the constitution, the Board of Managers of the Institute submit their report for the past quarter. Although the quarter has been one of those in which the active operations in the interesting branch of instruction are suspended, it has not been devoid of interest. The preparations for the exhibition of domestic manufactures, to be held in the autumn, the experiment of monthly conversation meetings, which has been in progress, the reference of the subject of weights and measures to the Institute, and the transfer of the collections of the Maclurean Lyceum to this society, have added variety to the usual duties and business of the institution.

The committee on premiums and exhibitions hold stated meetings with the committee of arrangement, to mature and execute their plans for the distribution of information to manufacturers and mechanics, in relation to the objects of industry to be exhibited in the coming autumn. By the liberality of the New Castle and Frenchtown Rail-road Company, that committee have been enabled to offer a premium for a successful method of preventing the escape of sparks from the flues of locomotive carriages, in which wood is used as fuel. The company have furnished a brief statement of the plans which had been tried before the offer of the premium, which statement has been communicated to those applying for information to the Institute.

The experiment of monthly conversation meetings, made by direction of the annual meeting of the Institute, has been highly successful. As was anticipated, the absence of formality in these meetings

has induced many to contribute to the information of their fellow members who otherwise would hardly have come forward, and where no special and avowed communication has been made, interesting remarks and discussions have been engaged in by many who came as listeners only. The months of July and August would be unfavourable to the assemblage, in comfort, of so many persons as frequent these meetings, and the Board respectfully recommend their omission during these two months.

By a resolution of the House of Representatives of this state, the Secretary of the Commonwealth was directed to refer to the Managers of the Institute, the bill relating to "weights and measures, and to admeasurement," with a request that report should be made, in relation to it, at the next session of the legislature. This bill, with the resolution of reference, &c. was received at the meeting of the managers in June last, and referred to a committee of nineteen to report to the Board. The names of the committee are appended to this report.

The committee on instruction have already commenced a revision of the arrangements of last year, in regard to the several branches thereof. The drawing school has received particular attention, and will, it is hoped, be materially improved in its organization. The committee have made arrangements to obtain from the professors, and to furnish to the class, a programme, or outline, of each of the regular courses of lectures.

The managers have made, during the last quarter, an arrangement by which the collections in natural history, books, and other property, of the Maclurean Lyceum of this city, have been transferred to the Institute, the members of the Lyceum becoming life members of this association. The entire right of disposal of this property has been vested in the Institute, and a committee has been appointed to effect the transfer of the articles to our Hall. In process of time, it is hoped to exchange such of these articles, as do not come within the scope of our society, for others more directly interesting to us, retaining such as will add materially to the interest of our collection of minerals and geological specimens.

The eleventh volume of the Journal of the Institute has been completed by the appearance of the June number. This journal, from the amount and interest of the original matter which it contains, furnished in relation to the patents by the editor, and in the miscellaneous matters by occasional correspondents, may, it is believed, stand an advantageous comparison with scientific journals at home, and with those in the same walks abroad. The circulation of this periodical should be anxiously promoted by every member of the Institute: they would thereby aid in diffusing through its means useful information in relation to the mechanic arts, and in general science, and look to an increase of subscribers to produce a diminution in the present price of subscription; in this point of view, each subscriber is interested in increasing its circulation.

The account of the treasurer is herewith submitted.

During the past six months the following persons have become life members of the Institute:—

R. La Roche, M. D.
Charles Robb
David Winebrener
Henry Paul Beck
R. F. Allen
Isaac Ashmead
Jacob Gilliams
John T Sharpless, M. D.
Frederick Fraley
J. A. C. Trautwine
S. G. Sheppard
Joseph Wood
C. B. Matthews, M. D.
B. M. Hollinshead
George L. Johnson
John Hewitt
Saml. Freedly, M. D.
Henry Lehr
Thos. Wardle
Wm. Foster
Wm. Kester.

Committee on Weights and Measures.

A. D. Bache
S. V. Merrick
W. H. Keating
Rufus Tyler
M. W. Baldwin
Benjamin Say
Asa Spencer
Abrm. Miller
Thos. P. Jones, M. D.
R. M. Patterson, M. D.
Sears C. Walker
Benj. Stancliffe
Thos. M'Euen, M. D.
Edmund Draper
David H. Mason
Benj. Reeves
Frederick Fraley
Samuel Moore
Samuel Hains.

A. D. Bache, *Chairman.*

William Hamilton, *Actuary.*

BIBLIOGRAPHICAL NOTICE.

Letters to a German Princess, on different subjects of Natural Philosophy. By Leonard Euler.—Harpers, New York.

We know not in what form these letters appeared in England, but certain we are that in their present form, as designed for popular instruction, a selection from them would have furnished one volume of a much more useful character than the present two. The acoustics and much of the optics, might have been advantageously preserved, and, in particular, the whole of the admirable little chapters on the means of determining the latitude and longitude,—which are indeed models of popular scientific writing,—while the greater part of the rest might with great propriety have been omitted. The magnetism, electricity, &c. of Euler's day, and particularly of a man who was so much given to speculation, as he was, is necessarily behind the age, to a degree not to be at all remedied by the occasional comments of an editor. We shall not indulge, after what we have said in any detail of criticism, but shall conclude our remarks upon this part of the subject by a few obvious comments upon what Euler considers an insurmountable objection to the theory of vision by reflexion, or that non luminous bodies are rendered visible by means of the light which

falls from them being in part reflected or thrown back from their surfaces. The objection to this view upon which he lays the greatest stress, is, that when reflexion does fairly take place, we see not the reflecting body itself, but the image of another which is the object reflected. Thus in looking into a mirror, we see not the mirror itself, as much as ourselves. And, moreover, it is urged that the reflexion proceeds according to a well established physical law, that the angle of reflexion is always equal to the angle of incidence, whereas we see non-luminous bodies at all positions of the eye, the object, and the incident light.

Now any one who has witnessed the operation of *polishing*, has seen enough to deprive this objection of its force. Where there is a number of small reflecting planes placed at different angles with each other, as in the natural surfaces of most unpolished bodies, although each ray of light that is reflected follows the law, it is manifestly impossible that an assemblage of such rays, constituting a beam,—the different rays falling upon different planes,—should be reflected in the same way as if they fell upon one continued superficies, as in the case of mirrors. In other words, there can be no *regular* reflexion; but irregular reflexion, or reflexion from variously inclined planes must ensue, the obvious effect of which is to prevent, by the scattering, the formation of any *image* by reflexion. The operation of polishing consists in reducing, as far as possible, this assemblage of small planes to one continued superficies; and in proportion as this is effected, regular reflexion takes place. Thus much as to our seeing, or not, according to circumstances, a reflected image. As to the other part of the objection, viz. that we see the reflecting body itself, it is to be observed that the only sensation by which we are rendered sensible of the sight of a body is a difference between the light coming from it, and that which proceeds from other bodies, whether a difference in intensity, or colour, &c. Now, since in the case of reflexion, there is always a diminution of intensity, different for different bodies, and always some, and generally a great, difference in the colour, and varying greatly for different bodies, we have an obvious solution of this part of the question.

It is, moreover, to be observed, that the light reflected on the incidence of white light is never homogeneous or pure, and consequently that the colour is not simple; and in like manner in the blackest bodies there is never a total absence of reflected light. Thus coal, the blackest body in nature, reflects a portion of white light. We have made this remark that we might more conveniently refer to a familiar example that affords a clear illustration of the above observations: we mean the ordinary operation of blacking a shoe. When the blacking is first put on, by far the greater proportion of the incident light is absorbed, and what is reflected is scattered by irregular reflexion. When the shoe comes to be rubbed with the brush, the gradual reduction of the various planes to a common superficies is shown in the regularity of the reflexion of the white light which had previously been scattered; (the total amount of this reflected light may also perhaps be increased by the alteration in the mechanical configuration of

the surface,) in a word, it *shines*, and this is doubtless the true theory of a *shining black*.

Euler was emphatically a mathematical genius. Here he laid the foundations of his fame, deep and wide. He has, moreover, the singular merit of having adopted and illustrated a theory of light, the undulatory, which has since afforded so beautiful an explanation of some of the most surprising phenomena of optics. He appears to have possessed that enthusiasm in a favourite pursuit which is the immediate characteristic of genius. He is said to have lost his eyesight in consequence of a fever brought on by his intense application during a period of three days to the solution of a mathematical problem. He left materials sufficient to comply with the request of a friend, that he would leave enough behind him to furnish annual memoirs on different mathematical subjects, for twenty years after his death; an injudicious request, however, for both his friend and himself seem to have forgotten the necessary march of science. Even in so short a time, much of that which at a previous period would have been so acceptable to the inquiring spirit of the times, has become, like parts of the present work, "behind the age." W.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Letters upon Natural History, Geology, Chemistry, the Application of Steam, and interesting Discoveries in the Arts. By Timothy Flint. Lilly, Wait, Coleman, and Holden, Boston.

Mr. Editor,—I had prepared some remarks upon the work of which the title is given above, with the design of submitting them to you for insertion in your Journal, when I found I had been in part anticipated by an article in your last number; if, however, you should think the thing worthy of further notice, my lucubrations, in a modified form, are still at your service.

The author of these lectures had become favourably known to the literary world by the information which he had given respecting the valley of the Mississippi, as well as on some other subjects, and it is to be regretted that he should have risked the portion of fame which he had acquired by the attempt to give instruction upon subjects of which he is grossly ignorant. When a man of learning can step down from the elevation which he may have attained, and furnish a lucid explanation of the principles upon which his science is founded so as to direct the first steps of the inquirer after knowledge, his conduct is worthy of all praise, as he becomes one of the best benefactors of his race. This, during the last half century, has been so frequently done, as to have afforded facilities in the business of education of which our forefathers had not the most remote conception. Whilst this has been accomplished, however, the world has been inundated by the trash which has flowed from the finger ends of those who have been "wiser in their own conceit than seven men who could render a reason," and it has become the occurrence of every day that some individual who has

got his name up by writing upon a subject of which he has happened to know something, undertakes to instruct the world upon various, or upon all, others. Many school-book makers might be brought forward in illustration of our position, but the fact is known to all.

Mr. Flint in the preface to the work before us professes to give "a condensed view of the prevalent systems and leading facts in science," and he has executed the task much as it might have been executed by an antediluvian; with this difference, however, that he has employed some terms which are believed to be of modern invention, and which, therefore, were scarcely known to Methusalah, or the other sages of that period, although they had about as correct an idea of the things signified by them as the author of the "Lectures."

The present notice must necessarily be confined to a few only of the errors in philosophy contained in the work of Mr. Flint; I have marked about two hundred of these on the margin of his book, although I have used my pencil on this occasion with a very sparing hand. The author, it appears, has followed, as a text book, "a French work, 'Lettres à Sophie,' by Aimē Martin," having, he says, rather paraphrased than translated it. I have not seen the original work, but were I to form an estimate of it in the guise which it has now assumed, I should be compelled to conclude, that it is written in that inflated style which is by no means uncommon among the minor French authors; if this judgment be incorrect, Mr. Amiē may perhaps discover to whom he is indebted for the injustice of it. With a few exceptions, the style of the lectures is bad; and, as a work intended for instruction, it must be considered as altogether worthless, even were its "facts" correctly stated; because, leaping over all first principles, it pretends to explain things which it is impossible to understand without them. How correctly, or rather how incorrectly, the facts and doctrines of the physical sciences have been treated, has been made apparent to some extent by the reviewer in your last number, and I shall merely make a few additions to the black list.

P. 18. "There are bodies which are not seen except in the form of solids, as the infusible metals, and the simple earths." Infusible metals do not exist, and most of the *simple* earths are known to be *compounds*, while all of them are believed so to be.

Ib. "The aggregation of bodies is chiefly effected by heat and chemical combination." What is here meant it is difficult to tell. I have been taught, however, that "the infusible metals and the simple earths" are aggregates; will Mr. Flint tell us how their aggregation is effected by heat?

Ib. "When the attractive force exceeds the repulsive, the body is solid; when both are in equilibrium, liquid." Why then do not the drops of rain fall into powder? Philosophers tell us, that is all philosophers with the exception of Mr. F., that the cohesive attraction exists in fluids; our senses confirm the information, and the book before us says that "two drops of water will run together."—p. 19. "The mixture of two substances results from a mutual attraction." Throughout the work, mixtures and chemical combinations are con-

founded together, and we are told that mixture takes place in consequence of "affinity."

P. 20. "The gravity of attraction." I have heard of the attraction of gravitation, and have attached some definite idea to the term, but the gravity of attraction is a complete novelty.

P. 21. "The attraction existing between homogeneous bodies is called *affinity*." Is it indeed? Do, I pray you, sir, give your authority, as this is the first time I have heard it so called.

P. 22. "When a force draws a body *towards* a centre, while the body has received from another force an impulse *from* the centre, the motion produced is called *central motion*." Should one of Mr. Flint's friends draw him towards the centre of a room, and another impel him with equal force in the reverse direction, that is, "from the centre," what will be his "*central motion?*"

P. 25. "Of opaque bodies whose surfaces are not polished, some send off nearly all the light they receive. These are white." Are not polished silver, statuary marble, and a hundred other *polished* articles, white? from the foregoing extract we must infer that they are not.

Ib. "Plane mirrors reflect the objects that fall upon them." Those that are not plane do something else, I suppose; we, however are not told what.

Ib. "Glass mirrors are the well known instruments employed for the common purposes of vision." The eyes of the author are employed for the common purposes of vision, *ergo*, they are glass mirrors.

P. 27. "In the camera obscura the images of distant objects are formed by a converging glass thrown upon some surface." Care must be, of course, taken upon what surface you throw your converging glass, or there may be some risk of breaking it.

Ib. "This is a most important instrument for a landscape painter, as the landscapes are represented with great beauty, and in perfect accuracy of proportion." Will Mr. F. put our camera obscura into order, for instead of "perfect accuracy of proportion," it bends all the styles of our square sash into curves, and renders all the angles spherical.

Dr. Wollaston's camera lucida is described on the same page with the foregoing, but the Doctor, were he alive, would not claim the bantling. Mr. F. says that it "consists of a quadrangular base, before which is placed a convex lens of considerable extent. Behind this in the base is a plane mirror placed at an angle of 45°, which reflects towards the cover the images of distant objects." Any passage taken at random from "Jack the Giant Killer," or any other literary work, would afford as clear and correct an idea of the instrument in question as does that above given; I have examined the camera lucida, of Wollaston but have never found the plane mirror, or the cover; and the same is the case with some of the other parts mentioned.

The lecture on affinity extends through six pages only, but the author has contrived to crowd into these more blunders and absurdities

than I have ever before seen in ten times the space; in this he has been singularly successful, as there is, in fact, scarcely a single truth, clearly expressed, contained in the whole of it.

P. 57. "The metals which are found in the bosom of the earth, owe their form and specific properties to affinity."

P. 58. "To this mysterious principle of nature we are indebted for the regularity of forms and qualities in organized and animal life."

Ib. "This affinity aggregates round the central nucleus of the seminal germ, be it the minutest molecule, a progressive pattern of the architype."

Ib. "Without this principle, the basis of order and classification in science would be destroyed, and the universe would be full of monsters before nature turned to chaos."

Ib. "This is clearly the cause of the phenomena of crystallization."

Ib. "They [the acids] are decomposed by combustible substances, and with metals form oxides."

P. 60. "The acids are the simplest among saline substances."

Ib. "Alkalies are saline substances, which have a sharp mordant taste; which, when concentrated, attract the humidity of the air." "Corrode and oxydate the metals, forming peculiar salts."

P. 61. "The fulminating powders * * * in the form of prussic or hydrocyanic acid has produced the most deadly poison yet known."

P. 62. "Both principles [affinity and caloric] appear to proceed from the same body, the sun."

Ib. "Increase the heat to another point, the molecules [of water] separate still further and become an elastic vapour. A little further rarified it becomes invisible vapour."

I have collected together the foregoing examples of the kind of information given in this lecture, in every one of which the chemist will meet with information not contained in any other work upon the subject. Were I to proceed with the marked passages, throughout the work, I should fill your seventy-two pages, and perhaps do something more than tire your readers; I shall, therefore, as I turn over the remaining three hundred and thirty leaves of Mr. Flint's Lectures, do no more than occasionally cull a nondescript, or pause to admire the lusus naturae, not a few of which are to be found there.

From a teacher of religion and philosophy we should not expect to meet with the remark, p. 73, that "The animals of prey, on the contrary, rarely banquet on their bloody feasts, but spend their time in guilty terror and apprehension, crouching in ambush for carnage." The propensities of the lion, the tiger, and the eagle, are as holy as those of the horse or the sheep; or of that animal even whose appetite is pampered by the sacrifice of the lives of so many of the creatures which browse on the earth, dart through the waters, or glide in the atmosphere, and who contrives instruments of various kinds to destroy them, for the supply of his wants, or to complete the catalogue of his

luxuries. Although the pious Watts has taught our children that hawks and kites are "unlucky birds of hateful name," this language would scarcely have been used by him had he lived in our day. He who created these animals gave to them their propensities, and pronounced them good.

P. 150. "Cause water to fall in mist between your eye and the sun, and you can make rainbows for yourself." In Newton's day it was necessary, in this case, to turn the back upon the sun, and to stand between that luminary and the spray.

Mr. Flint does not seem to know that steam is invisible, for whenever he speaks of it he treats it as a substance which can be distinctly seen. Of this I have already given one example, to which I add the following. At p. 184 he says "caloric entering into the particles of water dilates them first into steam, and then into invisible vapour." P. 305. "Carrying off a portion of the water in a visible form; this is called steam." *Ib.* "In the form of a visible elastic fluid will unite with the atmosphere."

To secure ourselves from lightning we have the following admirable recipe, p. 191. "It is only requisite to sit in a chair with glass feet, to cover the head with a silk veil, and to abstract from the person all ornaments of gold, silver, steel, or other metals." This would be about as effectual as a covering of tissue paper to protect a soldier against grape shot.

Respecting volcanoes and meteoric stones, we are presented with the following ridiculous stuff, together with much more of the like character. P. 209. "Different gases, according to M. Patrin, inflamed by the electric fluid, form the lava and other matters which the volcanoes emit." "Their fuel are the gases of which water is composed; that is to say, water and salt." "The stony matters are instantaneously formed by the contact of air, like a certain gas which changes instantly to quartz by the contact of water." "The basin of the Mediterranean would long since have been filled with a solid mass of salt if the volcanoes of the two Sicilies had not been placed in the midst of it, as prodigious laboratories to operate the decomposition of it. Admit this theory, and there is nothing strange or mysterious in the formation of meteoric stones in the atmosphere."

If your readers desire more of this kind of philosophy, they had better buy Mr. Flint's book, as in no other can they gratify their taste to so full an extent. The fifty-seventh lecture is "on the proper selection of books, and in this, if any where, is to be found the key to the present work. Speaking of the physical and exact sciences the author says, p. 389, "But I do not find these vehement partizans of the knowledge of facts and the exact sciences to be sensible and interesting companions." Mr. Flint has certainly determined, at all events, to be sensible and interesting in the highest degree.

A. B. C.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN MARCH, 1833.

With Remarks and Exemplifications, by the Editor.

1. For a machine for *Thrashing Grain, and Hulling Clover Seed;* Stacy West, Hartford county, Maryland, March 1.

In this machine there are to be three cylinders, each about eight inches in diameter, and covered with plates of rolled, or of cast iron, having narrow flutes, or ridges, over their surfaces. The rollers are to be placed nearly in contact with each other, so that lines joining their gudgeons would form an equilateral triangle. They are so geared as to move with very different velocities, thus producing a rubbing effect on any article passed between them. The grain to be thrashed is placed upon a feeding table, and passed between the rollers. There are sliding boxes and wedges to regulate the distances of the rollers. When used for hulling clover seed, an endless apron, and some other appendages are added, to adapt it to that purpose.

The claim is to the machine "taken together as a whole; but particularly the arrangement, and unequal motion of the cylinders, when thrashing grain, or rubbing out clover seed."

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2. For a process by which *Lard or Tallow is converted into two separate substances;* Hamilton Lapham, Lexington, Fayettee county, Kentucky, March 1.

This is a patent for separating from each other the stearine and elaine, or the hard and soft materials of which fat in general is composed. The chemist is well aware that this process has been carried to a considerable extent in France, and a patent has been obtained in this country also, by Messrs. Seybert and Vaneuxem, for accomplishing the same purpose, but by an improved process. The specification of which patent was published by us. We believe, however, that the alkali, or alkaline earth, employed in the French and American processes, has not been so completely separated from the stearine, as to leave it in a good state for combustion. The article, however, is much more beautiful than spermaceti, having a crystalline texture, and a pearl-like gloss of peculiar splendour.

The present patentee states that one of the substances which he obtains from lard, &c. is to be used as a substitute for spermaceti oil, and that the other is to be manufactured into candles.

The lard, or tallow, according to the present process, is to be put into a kettle with about one-third of its volume of water, and then heated until the water boils; during the process of melting, the whole is to be frequently stirred, so as to mingle the two fluids intimately together. As soon, however, as the boiling commences, and the scum rises, the stirring is to be discontinued. The boiling should be moderate, and the impurities be skimmed off as long as they continue to rise; eventually, clots will appear, instead of scum, when the fire is to be withdrawn, and the mass allowed to cool, until the clots sub-

side, and the fluid appears limpid; it is then to be removed into a proper vessel, and thoroughly cooled.

The next step of the process consists in putting the material into strong leathern bags, which are to be further surrounded by hair cloth, or other strong envelope. Several of these bags, with a flat plate of iron, or piece of plank, between them, are to be subjected to strong pressure until the fluid matter ceases to run out, and this is then ready for use.

The solid matter is to be again boiled with about one-fourth of its bulk of weak ley, the proper strength of which will be readily ascertained by experience; it is then ready to be manufactured into candles.

The claim is to "the conversion of lard, or tallow, into a substitute for sperm oil, and a superior article for candles, by the process above described."

In the processes heretofore essayed, the great difficulty has arisen from the using an alkali with the hard material, as it combines with it, forming a species of soap, and injures its combustibility; and such, we apprehend, will be the effect of boiling with a weak ley, in the last part of the above described process.

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3. For an improvement in the mode of *Manufacturing Wood Screws.* First patented April 1, 1831. Patent surrendered, cancelled, and reissued on an amended specification, to Hazard Knowles, Colchester, New London county, Connecticut, March 1. (See specification.)

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4. For apparatus for *Manufacturing Ship Thimbles;* Barnabus Thatcher, Yarmouth, Barnstable county, Massachusetts, March 2.

The first part of the apparatus is a pair of tongs, made like smiths' tongs, so formed that when shut the jaws will form a perfect circle, equal in diameter to the outer diameter of the thimble. A concave swedge, of the proper size and form, is fitted to the hole in an anvil. The ring, heated, and held in the tongs, is then to be struck by a concave tool, properly formed, by which means the thimble will be completed. It is said that a screw, or other press, with suitable dies, may be substituted for the tools above described.

There is no particular claim made, the process being considered as altogether new in its application. We do not know that this is not the case, although it is not improbable that a mode of operating so common in the making of thousands of articles, such as the swedge, or bed, and punch, has been adopted, if not here, in some of the European navy yards, in the manufacture of ship thimbles. If this has not been the case it is well for the patentee, as we are informed that the thimbles made by his process are not only more rapidly but much more perfectly formed than by that usually followed.

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5. For a *Machine for Manufacturing Bricks;* Richard Roberts, Berlin, Knox county, Ohio, March 2.

This machine is intended for pressing the bricks in the mould, for which purpose there are eight posts set round in a circle, and connected together by a circular plate at their upper ends, like upright studs for a circular room. On the outside of each of these posts there is a sliding piece of timber, secured to it by staples, which pieces, by being forced down, press the brick between their lower ends, and a projection on the post along which they slide. In the centre of the circle there is a vertical shaft which is to be turned by means of sweeps, and on the upper end of this shaft is a circular disk, which has upon its upper side, close to its periphery, several pieces, which act as cams, or lifters, and give to it the appearance of a crown wheel. These act upon levers which have their fulcra in the upper ends of the posts, to which they stand at right angles, their long arms pointing as radii towards the centre of the circle, and their short arms forcing down the pistons on the outside of each post.

There is no claim made, but it is said that "the advantages which this machine claims over others now in use, consist in great strength and durability, resulting from a judicious distribution of the materials it is composed of."

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6. For an improvement in the *Mould for casting Metal Spoons, mith a steel or iron bar along the handle;* Thomas Mix, Cheshire, New Haven county, Connecticut, March 5.

In the number for March last, p. 162, vol. xi. a mode is noticed of casting spoons which are strengthened by means of flat pieces of iron or steel wire along the handles, a patent having been obtained therefor by Mr. Charles Goodyear, of Philadelphia, August 11th, 1832. Mr. Goodyear casts the handle in two parts, and unites them by soldering, but the present patentee inserts the wire in the mould, before casting the spoon, a part of the wire projecting beyond the end of the handle, which part is to be cut and trimmed off. The moulds are made in the usual form, but one of the parts at the handle end, is about half an inch longer than the other, and to this is secured the iron or steel wire, in such a way that it shall not touch the inside of the mould, but allow the metal to flow round it. The wire is to be tinned, before it is inserted. The claim is to the particular plan described, of holding the steel or iron at the end of the handle, so that it may be extended entirely through the handle into the bowl, without touching, or coming in contact with, the mouldings.

We do not think that this patent interferes with the former, Mr. Goodyear having confined himself to his particular mode. Had he been well advised, however, he would have made his claim more broad, and have embraced the inserting of an iron or steel wire, generally, for the purpose of strengthening the handle of a cast metal spoon.

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7. For an *Apparatus for the treatment of Fractures and Artificial Joints;* William Wood, Smithfield, Jefferson county, Ohio, March 5.

This is essentially the same with the apparatus described in vol. xi. p. 26, and which itself was noticed as similar to instruments well known to the surgeon, and published in surgical works. Mr. Wood does not designate any thing which he claims as new, and has therefore failed in the plain requirements of the patent law, and secured nothing.

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8. For an improvement in the *Bar Share or Fallow Plough;* Gideon Davis, Georgetown, District of Columbia. First patented October 1st, 1825. Patent surrendered, cancelled, and reissued, March 6.

(See abstract of the specification, p. 244 of the last volume.)

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9. For *Softening Hides for Tanning;* Willis Berry, New Shane, Kennebeck county, Maine, March 6.

A vat sufficiently large to hold twenty-five hides, is to be so far filled with water as to allow room to receive the hides. Half a bushel of lime, the same quantity of ashes, twelve pounds of potash, five pounds of oil of vitriol, and four of muriatic acid, are to be added to the water, and incorporated with it by stirring; the hides are then to be passed into the liquid, and to remain in it for three or four days, when they are to be taken out and split. If not sufficiently softened they must be put into the lime vat, and remain there until they are so. Another vat is then to be prepared, and is to receive a bushel of ashes, and of slaked lime, with four pounds of potash; from this vat the hides are to be drawn every other day, until they are well raised, and the hair loosened, which may require six or seven days. After this, they are to be put into good lime liquor, until fit to unhair; then put into the second vat for one day, and fleshed; they are to be worked on the grain the next day, when they will be prepared for tanning, as usual.

For upper leather hides and calf skins, the process is nearly the same.

The chemist will at once perceive that the patentee proceeds altogether empirically, and that the good effect, if any, which is produced by the oil of vitriol, muriatic acid, lime, ashes, and potash, may be obtained by using the salts which will be formed in the vat as soon as these articles come into contact with each other. The patentee has made no claim, and is therefore limited to the use of the ingredients which he has specifically prescribed.

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10. For a *Churn;* Webber Furbish, Hallowell, Kennebeck county, Maine, March 1.

This churn is intended to facilitate the making of butter, by lessening the labour usually required. This is to be effected by the machinery described, which is called "*Furbish's application of lever power to churning.*" This lever power is intended to cheat nature out of her rights, by connecting two or three wheels, a band, a crank, and two or three levers, in such a way that the analysis of them

will involve her in some difficulty, and induce her, from sheer idleness, to allow them to gain power, without any assertion of her claims. The patentee, however, has not omitted his own, but says, "I claim the invention of the whole of this machine; that is to say, the application of the several wheels, the band, sweep, and lever, in this form, and for this purpose, or for any other purpose to which this machine and this power, in this form, can be applied."

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11. For a *Machine for punching and bending Wheel Hoops or Tires;* William Hinds, Springfield, Otsego county, New York, March 7.

The punching machine is merely a bed, to receive a piece of steel with a hole of the size required, and a second piece of iron perforated to serve as a guide to the punches to be used. The bending apparatus is intended to bend the tire without heating it. This consists merely of a lever, one end of which is placed under a staple, or stirrup, which is its fulcrum. The lower side of the lever, close to the fulcrum is to be made convex, or, to have convex pieces attached to it. The bed of the machine is of wood, and the iron to be bent is passed between the convex part of the lever and the wooden bed, where it will be bent by depressing the lever. "The invention of the machine, on the different principles specified and described, is claimed."

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12. For a *Machine for Striking Brick;* Andrew W. Duty, Sangerfield, Oneida county, New York, March 7.

This is, in fact, a brick press and striker. The prepared clay is to be put into a hopper, the opening in the bottom of which is of such size as will correspond with the mould to be passed under it. A piston extends from side to side of the hopper, its width being equal to the length of a brick. This piston is forced down and raised by a toothed segment on the end of a lever, which works into a rack on a vertical shaft. The moulds, placed on a firm carriage, are passed under the hopper by another lever, operating in a similar way on a horizontal shaft. When the mould has arrived at its proper place, the pressing lever is forced down, and causes the piston to descend and fill it. The mould is then withdrawn by the other lever, a striker, properly placed, acting upon the surface, and leaving the pressed bricks perfectly smooth.

The machine, with its appendages, is described at length, but there is no claim made.

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13. For *Canal Boats*, to be propelled by steam or other power; Francis Albert Dorman, Norfolk, Norfolk county, Virginia, March 7.

The patentee reasons with great confidence on the beneficial effects which are to result from the construction of canal boats with paddle wheels upon his plan, and which he calls parry-waves. In several points, however, we are unable to follow him to his conclu-

sions, which probably arises from our not exactly understanding his views. We are fully of opinion, however, from the whole aspect of the contrivance, that the project is an untried one, and that, in certain particulars, at least, the experience connected with it will contradict the theory; an event by no means uncommon.

These canal boats are to be made with flat bottoms, allowing one foot of water between them and the bottom of the canal. The paddle wheels are to have their paddles made of iron or brass, metal being much preferable to wood for this purpose. They are not to run in straight lines from rim to rim of the paddle wheel, but are to form an angle in the centre, thus ∨. The paddle wheel, we are told, then "presents an angle to the mass of water, strikes it with a velocity equal to that of the water, separates it, and prevents the shock. The hinder part being concave, in striking the water, unites it, and prevents its escape; and at the end of the rotation, (the paddle being always perpendicular, they exert the same power till they leave the water,) leave the water without raising one single particle, which is a great defect in straight paddles that raise an immense quantity." We hope our readers will be better able to comprehend this than we are. How the paddles are to leave the water perpendicularly we know not, as they are fixed to the arms in the usual way; and even if they did do so, we cannot tell by what unseen influence they are at that moment "to exert the same power," and to do many other things. We have not room, however, for the statement of all our difficulties in this matter, and shall therefore cease to urge them, giving nothing further than an abstract of the description of some other parts.

The "*parry-waves*" are a sort of lattice work, extending along the sides of the boat, without the wheels on each side. If the boat has a draft of three feet, these parry-waves are to have a height of four feet, extending one foot above the water level. They are to be twenty five feet long, to be made of iron or brass, with openings five inches wide, and three inches apart.

The wheels may be placed in front of the boat, in which case there may be two of them on the same shaft, or there may be four wheels, two on each side.

The claim is to "the construction of the boat; the paddles of the wheels; the parry-waves, and the general combination."

There have been many contrivances, patented and unpatented, made with a view to prevent the waves from washing the banks of a canal, and which it has been hoped would allow of the giving to the boats a velocity greater than usual; and the only thing which seems to interfere with their efficiency, is the quantity of water displaced by the boat, the whole of which must, in its progress, flow from stem to stern, to fill up the cavity which would otherwise be left there. If there is any one among our numerous schemers who can contrive a boat which shall not displace its own weight of water, the goal will be reached, the victory achieved, and the crown awarded; for this discovery, however, we apprehend that we must await the *Greek calends.*

14. For an improvement in *Manufacturing Confectionary* of all kinds; Robert L. Stuart and Alexander Stuart, city of New York, March 7.

The patentees inform us that the discovery claimed by them "consists in the application of sirop, or sugar, purified by a steam process, exclusively for the manufacture of all kinds of dry confectionary, and lemon sirop."

The confectionary so manufactured is said to be more pure, and of a lighter colour than any heretofore made. In the claim the patentees say that they "do not claim as their invention either the apparatus, or steam process, for purifying sugar. But they herein claim the privilege of applying sirop, or sugar, purified by steam process, exclusively for the purpose of manufacturing confectionary; also for making lemon sirop."

The wooden boiler used, and the mode of introducing steam through tubes, is described, but as this is confessedly not new we need not remark upon it; there appears, however, to be some reason to doubt the validity of what is claimed as a "discovery." Every one, understanding the subject, knew that sirop, or sugar, purified by steam process, would make good confectionary, and lemon sirop; and every one, before this patent was obtained, was at liberty to apply such sirop, or sugar, to all purposes to which sirop and sugar are usually applied. There appears to us to be no more ground for the making such a claim, than there would be to the use of such sugar, or sirop, to the sweetening of tea and coffee, provided it had not been so employed.

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15. For *Machinery for Making and Pegging Shoes;* Saml. Preston, Danviers, Essex county, Massachusetts, March 8.

This is an ingeniously contrived, and, we think, a well arranged apparatus for making shoes, fastened by wooden or metallic pegs. The specification is of considerable length, and although it describes the machine clearly, it would require an engraved plate for its illustration. The claims made are the following:—

"What I claim as my own invention in the within described apparatus, is that arrangement thereof by means of the intermitters, or a single intermitter, or other analogous contrivance, with the guides, and other appendages, by means of which the shoe carriage is caused to advance with the shoe thereon, whilst the pistons carrying the awls and drivers, receive, by means of guides, or formers, a lateral motion, following the shape of the sole of the shoe; whether these motions be effected precisely in the way described, or in any other producing a similar effect.

"I claim also the arrangement of the parts of the machinery by which the pegs, or nails, are driven by one set of pistons, in the holes made by the awls in the pistons by their previous descent.

"I claim, likewise, the splitting the peg from the end of a slip of pegwood, or the cutting of pegs or nails, from a strip of metal, and the instantaneous driving thereof into the proper place.

"I further claim the application of the forcing apparatus, the piston, and also the forcing wheel, and the method, subsequently described, of smoothing and polishing by means of revolving wheels."

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16. For a *Horizontal Wind Mill;* Solomon Deming, Brunswick, Madeira county, Ohio, March 8.

There is some obscurity about the description of this contrivance, but still, through the palpable obscure, we can perceive enough to convince us that the difficulties which have hitherto attended the use of horizontal wind mills, will not be removed by the present modification of them. A vertical shaft is to be erected, and to arms, or heads which it carries, there are to be attached about twelve vertical wings, upon which the wind is to operate. The wings are to stand at an angle of about fourteen degrees with the shaft. This part is to be surrounded by frame work, sustaining eight, or any other suitable number of doors, hinged to vertical posts. These are to be opened or closed by cords and pulleys, to admit or arrest the wind, according to circumstances.

The invention claimed is "the before described wind wheel, particularly the wings or fans attached to the arms, or heads, the shutters for letting on and off the wind; and the ropes, weights, and pulleys by which they are opened and shut."

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17. For a *Cooking Stove;* Henry L. Bidwell, Berlin, Hartford county, Connecticut, March 8.

This apparatus is called a *Digesting Furnace or Cooking Stove*, and it is represented as being divided into two parts; the fireplace, and the *Athanor*, or digesting furnace. The fireplace may be in the form of the common Franklin stove, with doors in front to close it. The *athanor*, or digesting furnace, projects back behind the fireplace. Suppose, for example, the top plate of the stove to extend back beyond the body of it for two feet or more, and a second plate of the same size to be placed parallel to, and about four inches below it; these two plates, when enclosed at the sides, would form a wide horizontal flue, at the back of the fireplace. At the extreme end of this, there is a pipe, or other suitable exit, for the smoke. The upper plate of this *athanor* is to be perforated to receive pots, kettles, stew pans, &c.; and there may be two perforations of larger size through that part which forms the top of the stove immediately over the fire. A ring, or hoop, is to be passed within each of the openings in the *athanor*, to extend from the top to the bottom plate, so that when the cooking utensils are removed, the smoke will not escape. Dampers, shutters, or throttle valves, are to be inserted so as to cut off, lessen, or direct the draft.

We suspect that the placing of the above named rings, or rims, between the heated air and the cooking utensils, will be found to be bad economy, as it will be a little like placing one pot within another, and however closely they may fit together, the interchange of heat

between them will be very slow compared with that which would result from the direct action of the fire.

The parts claimed "are all those specially designated under the second head, called the *athanor*, or digesting chamber."

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18. For an improvement in *Pumps for Water;* Martin Mettee, Baltimore, Maryland, March 9.

On the 20th of May, 1830, Mr. Mettee obtained a patent for an improvement in pumps, with a view to prevent the introduction of stones and other injurious substances into them, a notice of which patent will be found at p. 85, vol. vi. The present patent has the same object in view, and the patentee has manifestly taken great pains to accomplish it. The specification consists entirely of references to the drawings, which are fifty-six in number, showing his mode of forming and connecting the various parts appertaining to the handle and spout, to which his improvements are confined.

At the close of his specification he says that after a careful examination, "I believe the improvements embraced in these drawings and descriptions to be of my own invention, yet I wish it to be distinctly understood, that I claim nothing in either the principle or the application which shall not prove to be my own, and new."

Be it remembered, however, that to divide the chaff from the wheat, the old from the new, belongs not to the public, but to the patentee, and that the saving clause which he has introduced, as expressive of his good intentions, will not be as dust in the balance of the scales held in the hands of justice, or rather, perhaps, of law.

We see no reason on the present occasion, to modify the remarks made on the former patent, but think them, generally speaking, perfectly applicable to the present.

When we noticed Mr. Kreig's pump, (No. 11 in the Journal for last month,) we were impressed with the idea that this second patent to Mr. Mettee was of later date than that before us; this, however, is a mistake of no importance whatever.

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19. For a *Safety Chain to be used in careening Ships;* James Fales and Thomas D. Brown. New Bedford, Bristol county, Massachusetts, March 9.

The safety chain is intended to brace the mast, by connecting one end of it to the top of the mast, and the other end to chains connected with the wales. The chain leading from the top of the mast, is to be connected to those attached to the wales by the intermedium of a screw, which turns in nuts attached to the chains, and by which they may be rendered tort. These chains are to be fixed on the side opposite to that on which the vessel is to be hauled down.

The claim is to the connecting such chains in the manner, and for the purposes described.

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20. For an improvement in the *Broad Power Loom;* John Leland, Milbury, Worcester county, Massachusetts, March 9.

After describing the construction of the loom, it is observed that in all the power looms now in use, the shuttle is driven by means of stud collars inserted into the cams by which the harness is operated; and that the usual number of beats, or jerks, for a loom weaving cloth of from ten to twelve quarters wide, is forty per minute; and as the cams in a loom for plain cloth revolve but half the number of times the lathe beats, and but a quarter of the number for kersey, the motion given to the stud rollers is very slow, which requires the inclined planes of the picker shoe, where the stud rollers are received, to be very steep or abrupt, in order to give sufficient force to the shuttle; and the motion thus given to the shuttle is a very hard and unnatural one, producing a trembling and agitation throughout the whole loom. To obviate this difficulty, and construct a loom in which the shuttle motion shall remain the same, not only for plain cloth but for kersey, or any kind of double work, is the object of this improvement, which consists, first, in placing the lathe shaft in such a position in the loom as to admit of its operating not only the vibrating cams, but of its driving the shuttle. Secondly, in ranging the vibrating cams to the pivots on which the lathe standards rest, and hanging them to the same. Thirdly, in motioning the shuttle with but one stud roller, and one picker treadle.

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21. For a *Machine for Cutting Straw, Hay, &c.;* James Luckey, city of New York, March 9.

This cutting machine is self-feeding, and differs in the mode of effecting this, as well as in other respects, from any of those cutting machines which we have previously seen. The straw to be cut is put into a hopper, and descends by its gravity, so that its ends project through the opening at the lower end, which is in the form of a flat spout. The straw rests upon a table placed at such distance below the end of the hopper as is equal to the length to be given to the cut straw; this table is adjustable by screws. The cutting knife is fixed across a frame which is made to traverse horizontally backward and forward, under the end of the hopper. It is placed obliquely, and has two cutting edges, causing it to operate in passing each way.

When used for hay, one side of the lower part of the hopper is hinged, and has a spring bearing on the outside of it to compress the material to be cut. The knife, in this case, has but one cutting edge acting towards the fixed side of the trough. Some provision will certainly be required for forcing the hay down through the hopper, otherwise it will, from its elasticity, bear against its sides, so as to prevent its descending by its own gravity.—The claim is "to the before described machine."

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22. For a *Washing Machine,* to be used also as a *Churn;* Oliver H. Brooks, Bethel, Windsor county, Vermont, March 11.

A trough is to be made in which there are to be two sliding blocks of wood, nearly touching its bottom; each of them attached to rods by which they swing from end to end of the trough, like pendulums. The

ends of the trough are to be fluted or reeded like wash-boards. The pendulous pieces are made to vibrate in opposite directions, by means of a compound lever fixed at one end of the trough.

We do not think this a good washing machine, and view it with still less favour as a churn: there is, moreover, little novelty in its construction, double blocks having been before made to vibrate in a trough in reversed directions.

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23. For a *Reacting Water Wheel;* Robert Eastman, Concord, Merrimack county, New Hampshire, March 11.

(See specification at p. 320 of the last volume.)

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24. For an improvement in the *Wool Carding Machine;* John Boynton, Coventry, Tolland county, Connecticut, March 11.

The improvement here patented is in the form, and the manner of driving the tubes for giving the countertwist to, or condensing wool or cotton roping. The tubes are to be trumpet mouthed, and in this consists their improvement in form. They are to be made of cast iron, about one inch in diameter, and the outsides of them are to be cylindrical. They rest upon a revolving strap, which passes over a rail beneath them, their friction upon this strap, from their own gravity, being sufficient to drive them. These two points only are claimed; but as the tubes have been already patented, as long ago, at least, as the year 1826, and have been made by Mr. Goulding and others in a great variety of forms, we are apprehensive that a variation in the mode of driving them will not enable its contriver to take the invention of another, and apply it to his own use, unless this invention may, from some cause, have become public property. The patent law, and the practice under it, discountenance such a procedure, which, if tolerated, would leave the "true and original inventor" at the mercy of every one who had ingenuity enough to vary the form of a thing, whilst it remained substantially unchanged.

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25. For a *Rotary Steam Engine;* Abraham Potts, and Benjamin F. Pomeroy, Pottsville, Schuylkill county, Pennsylvania, March 11.

A wheel is to revolve by the action of steam introduced into it through a hollow shaft, and passing thence through four curved spokes, or channels, within the wheel, is delivered tangentially at its periphery. The wheel is represented in the form shown in the sketch.

This "new and useful" improvement will be found to be old and useless. It is a mere variation in the form of the oldest steam engine upon record. In the curved steam channels there is no use whatever; the wheel might as well be a drum, with

openings at its periphery, directed tangentically. This same plan has undergone numerous modifications, to one of which only we will now advert. On the 8th of April, 1829, (See vol. iv. p. 53,) Mr. Elijah Bryan, of the city of New York, obtained a patent for a similar contrivance, to be applied to the driving of carriages. The steam was to pass through hollow axles into the hub of the wheel, and then through curved spokes, whence it was to be delivered at the periphery.

The claim, in the present patent, is to "the introducing the steam as before described by the hollow shaft; also the steam buckets, and mode in which they act." By the *steam buckets* are intended the curved channels.

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26. For an improved *Water Wheel;* Richard Walker, Milton, Strafford county, New Hampshire, March 12.

There is much resemblance between this water wheel, and the rotary steam engine just described. The wheel is to run horizontally like Wing's and most of the other reaction wheels, and from its centre to its periphery, it is to have three channels, or water ways, constructed like the four in the foregoing rotary engine. The water is to be conducted down through a vertical trunk, then horizontally, and then up through a tube into the centre of the wheel on its lower side. The pressure of the water thus forces the wheel upwards, and counteracts the effects of its own gravity, and that of its appendages. The wheel must, of course, fit closely to the tube through which it receives its supply.

It appears that the patentee makes large calculations upon the curved form of the outlets, as he informs us that "the continual pressure of water on the outer circle, gives the wheel its motion." We can assure him, however, that he may apply our remark respecting the rotary engine to his wheel; make it a drum, leaving only the proper openings in the periphery, and he will lose nothing in its action, whilst he will gain something in the labour of construction. If the "continual pressure of the water on the outer circle gives the wheel its motion," is there not an equal pressure upon the inner circle, and what is the effect of that?

The claim is to the "taking in the water on the under side of the wheel, with an upward bearing, by which the wheel is relieved of its own gravity, to the full amount of the force of the column of water taken in; and the construction of the wheel to make the water act with full force from the centre outward in every part alike at one and the same time, through said buckets or semicircular outlets by which the wheel gains its motion." We cannot say any more in favour of the novelty of the upward pressure, than we have said of the novelty and utility of the curved channels.

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27. For a machine for *Hulling Clover Seed;* Jacob Gans, Fayette county, Pennsylvania, March 12.

A cylinder covered with sheet iron, punched like a grater, is to

turn in a concave with a similar covering. The claim "in the before described machine for hulling clover seed, is, its general arrangements and combination for the purpose above set forth." We know of no machine for the purpose which could lay claim to greater antiquity, although this is a claim which the patentee has not urged.

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28. For an improvement in the *Cans used in the manufacture of Cotton;* Horatio Moses, Paterson, Essex county, New Jersey, March 12.

A hoop of cast, or of malleable iron is to surround the top of the can, "for which improvement the patent is claimed." The description of this invention employs only thirty-one words, including the references to the drawing. On the 20th of July, 1831, John Butterworth, of Philadelphia, obtained a patent for putting iron hoops on the bottoms of drawing cans; we have now one for hooping the top, and perhaps some one may find room enough in the middle for a third; a man, then, by the purchase of three rights, may hoop his cans completely with iron. If it is desirable to give greater strength and permanence to the tops of cans than has been usually given, would not this end be accomplished were the tinman to surround them with one or two large wires in the ordinary way of wiring edges? this, we presume, would not interfere with the patent, although hoops of malleable iron would be employed.

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29. For a *Mortising Machine;* George Page, Keene, Cheshire county, New Hampshire, March 13.

This machine is described at great length, but the drawing which accompanies it is but indifferently executed. There is enough, however, to show that, in its general operation, it resembles most of the mortising machines which have preceded it; and, indeed, as there are many of them, it is scarcely to be expected that much novelty would appear in a new machine for performing this simple operation. The claims are necessarily confined to matters of mere arrangement; and most of them are of a character rather trivial; they consist in the rotary motion of a slide; a wire guide; steel springs and grooves; a clevis and pins; the increasing or diminishing the power of a lever, by holes changing its fulcrum; a round socket in the slide, and a round shank to the chisel, allowing it to be put askew; and a driver for removing the chips.

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30. For an improvement in *Lamps;* Ira Crouch and James A. Frary, Meriden, New Haven county, Connecticut, March 13.

This is a hanging lamp, the body, or reservoir, of which is a tube bent round in the form of a ring, having an exterior diameter of about seven, and an interior of about four inches; this tubular reservoir will hold about one pint of oil. Four tubes for wicks extend from the inside towards the centre of the hoop, bending upwards, and leaving a central space of about two inches in diameter. The burners may

have spaces of an inch in breadth, and one-eighth of an inch in thickness; over these a glass chimney is to be placed.

As regards claim, the patentees say "we do not claim as our own invention the central opening merely, for a downward light; that has long been known and used. But we do claim as our invention the circular band, and the peculiar form and construction of our lamp."

On the 3d of March, 1831, Mr. Lawrence, of Meriden, obtained a patent for a lamp essentially like the foregoing, of which there is a description in vol. viii. p. 18; and another patent by the same gentleman for nearly the same thing, may also be found in vol. xi. p. 311. The main difference between these and the one before us being in the shape of the ring-like reservoir for oil; the present patentee makes the tube of which the ring is formed, oval, the longest diameter standing vertically: Mr. Lawrence made his of segments of two circles, as may be seen by turning to the articles referred to; this, we think, is one of those changes of form which would not, in law, be deemed an improvement.

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31. For *Cementing Cloth;* Reuben Brackett, Boston, Massachusetts, March 14.

The cementing is to be effected by means of a solution of India rubber, so as to unite two edges together without sewing, and in this the whole claim consists; such solutions, therefore, are to be used as are already known.

The cementing of cloth, by means of a solution of caoutchouc is not a novel process; water proof cloth having been prepared in England and France by cementing together two thicknesses, for the purpose of making cloaks and other articles. Cloths of two colours have sometimes been so united, when it was desired to have the lining of one, and the outside of another colour. As regards the uniting of seams in this way, it may undoubtedly be effected so as to render them perfectly firm, and we are not aware that the doing so has ever been proposed previously to the obtaining of the present patent. Whether the appearance of the seams will be such as to please the eye, and whether the cementing can be effected without keeping the cloth under pressure for a period which may be inconvenient, are questions which the patentee has probably asked and answered.

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32. For *Frames, or Foundations, for Stocks, Cravats, &c.;* William, Merriam, Meriden, New Haven county, Connecticut, March 14.

The warp is to be laid of a proper width for the stock, and the filling is to be of hair, with the exception of two or three inches at each end of the stock, where flax or hemp is to be used, this serving the better to secure the hair, and to attach the straps, &c. The claim is as follows:—

"I do not claim as my invention the art of weaving hair cloth as it has been usually practiced, nor of weaving cloth of yarn filled with

hair; but I do claim as my invention the art of weaving bristles, in the manner and for the purposes above described."

33. For a *Water Wheel;* Theodore Lomis, Athens, Bradford county, Pennsylvania, March 14.

The patentee has baptized his invention *Lomis' Submersive Hinge Bucket Water Wheel*; and, like its brethren of the hinged kind, it is to be driven by the force of a current in descending streams, or by the tide in rivers where it ebbs and flows. He says that "the principle invented and claimed as new by the author, is the wheel being placed in any water having motion." Had he been in the habit of reading our lucubrations, the pleasing dream of originality in this particular, would have been often and sadly disturbed; but, as "where ignorance is bliss, 'tis folly to be wise," he may have done well in having avoided this means of destroying his cherished anticipations. Having taken a patent, however, he must needs seek to prove its validity, and this will of necessity let in on him the full light of truth, and will, we fear, at the same time, dazzle and disturb him as it dissipates the clouds which have hitherto obstructed his vision.

In a wheel of this hinged construction, the patentee tells us that "the surface of the buckets on one side of the wheel is operated upon, giving it motion; while the buckets on the other side, folding outward, return to their places of labour edgewise, and when receiving the water are at their proper place of labour without friction."

Instead of repeating, we will merely refer to our observations on similar wheels, which may be found in nearly every volume of this journal.

34. For a *Machine for Breaking Corn;* Webber Furbish, Hallowell, Kennebeck county, Maine, March 15.

Two iron rollers of about two inches in diameter, are to be placed parallel to each other, nearly in contact, and in the same horizontal plane; one of them is to be smooth; and the other fluted. A cog wheel takes into a pinion on the shaft of the fluted roll, and the corn to be broken is to be fed to the rollers by a hopper. The patentee claims "the position and application of the different parts of this machine, in the form, and for the purposes, to which it will be devoted."

35. For a *Metallic Nipple Shield,* or artificial Nipple; John J. Heintzleman, city of Philadelphia, March 16.

A metallic shield is to be made of silver, tin, or other suitable metal. This shield is made trumpet mouthed to receive the nipple, its extreme diameter where it lies on the breast being nearly two inches. At its upper part it is perforated by several small holes; above these extends a tubular part over which is slid what is denominated a guard, against which the lips of the child will press in the act of sucking. The artificial nipple is a hollow piece of metal, adapted to the parts above described in such a way that by the intervention of a spiral

spring a degree of elasticity is given to the guard which relieves the mouth of the child.

The claims are to the general construction of the whole, with the application of a spring, affording the required degree of elasticity. A covering of gum elastic, or other material, it is observed, may be employed to give softness to the nipple part of the apparatus. It is proposed also to apply the elastic nipple to a bottle, when it becomes necessary to use one for the nourishing of the child.

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36. For a *Contracting Iron Band;* Edward Cooper, Richmond, Virginia, March 16.

It has been common on vats and other large circular vessels to put hoops which are tightened by a wedge driven through loops in the ends of the hoop; the object of this contrivance is similar, but the arrangement of the parts different. The ends of the hoop are to lap over, and they are so formed that a wedge driven in between them operates to draw them together, something in the manner of a spliced girder. The patentee says that these bands may be put round boxes, kegs, &c., but they certainly would be too expensive for such articles. A sea captain, who saw the model in the patent office, has suggested the idea that they are better adapted to the hooping of masts than any thing now in use for that purpose.

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37. For a *Mode of protecting Hay and Grain from the weather;* Francis Wright, Hallowell, Kennebeck county, Maine, March 19.

Tarpaulins are to be made of a suitable size, and are to have strings at their corners to fasten them to small stakes which are to be driven into the ground, when they will serve to protect the stacks or cocks from the weather. The claim is to the employment of coverings in this way.

We know not how many persons may have suggested the same idea, but we can answer for ourselves, that more than thirty years since, when boarding at a farm house, we proposed this plan to the farmer, and he at first entertained the idea of putting it into practice; but upon further consideration, came to the conclusion, that the number of such coverings which must be procured, the time they must lie idle, their stowage, removal, wear and tear, &c. would render them a bad speculation. We dare say the farmer was right, and that most of that class of citizens, were they to reflect upon the subject, would arrive at the same conclusion; perhaps, however, the stimulus of a patent mode may suddenly arouse their dormant energies, and induce some of them, without reflecting, to "*buy a right.*"

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38. For a *Machine for Cutting Sausage Meat;* Joseph Wagoner, Brunswick, Schuylkill county, Pennsylvania, March 19.

A cylindrical piece, set with steel teeth, knives, or points, is to revolve in a hollow cylinder, or tube, having also rows of teeth along it. The meat is to be fed from a hopper placed above one end of the

machine, which lies horizontally. The revolving cylinder immediately under the hopper is cut screw fashion to carry the meat forward in order that it may be acted upon by the teeth, or knives. The space between the cylinder and tube decreases as the meat recedes from the hopper, and passes towards the point of delivery, where the annular opening is to be small. Although this machine is intended to make minced meat which may be easily swallowed, we have some fear that it will choak itself in the operation.

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39. For a *Machine for rolling metallic plates, with projections, or teeth, thereon*, for covering cylinders and concave beds of machines for rubbing out clover seed, shelling corn, thrashing grain, &c.; Robert Rittenhouse, Amwell, Hunterdon county, New Jersey, March 19.

Two hard, metallic rollers are to be mounted in the ordinary mode of mounting a flatting mill. One of the rollers is to have indentations of such form, and in such relative numbers, as may be required on the plate. The other roller is to be smooth, and between the two the plates of iron are to be rolled in the usual way.

When steel plates are required, they are to be first decarbonated, then rolled, and recarbonated.

The claim is to the making of such plates, adapted to the purpose designated.

The main difficulty which presents itself in attaining the end here proposed, results from the necessity of raising the asperities to the full height at one rolling, as the plate will stretch in the operation, and render it impossible to send it through a second time. If this can be effected, the article produced will no doubt be valuable when applied to the above purposes.

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40. For an improvement in the *Machine for rubbing out Clover Seed, Shelling Indian Corn, &c. &c.;* Robert Rittenhouse, Amwell, Hunterdon county, New Jersey, March 19.

This patent is taken for using the plates rolled out by the foregoing machine, it being expressly stated that no claim whatever is made to any improvement in the general form of the machine.

This does really appear very much like taking two patents for the same thing. The first being for "a new manufacture," the second for the right to use the thing made. If the patentee disposes of a right to his first patent, must the purchaser buy a second right to use it? Can a man take a patent for a new manufacture of fire arms, and compel those who buy his guns to purchase also a right to shoot with them? If I buy cloth of a new kind, which has been patented, is it possible that the patentee can compel me to purchase a right to put my own cloth into the hands of the tailor before it can be made up? "May be so, but may be not."

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41. For an improvement in the *Roller Gin for Ginning Cot-*

ton; William Whittemore, senr., and William Whittemore, jr., West Cambridge, Middlesex county, Massachusetts, March 21.

A very minute description of the roller gin is given in the specification, which refers throughout to perspective and sectional drawings. The parts which are claimed as new are plainly designated, and consist of "the guard, felts, and clearer." *The guard* is a piece of cast steel, which works upon two arms in the frame of the ginning rollers, its lower edge, which is to be about one-sixteenth of an inch thick, smooth, and rounded, drops nearly into contact with the felt or the lower roller. The object of this is effectually to prevent the seeds of cotton from being drawn in with the staple between the rollers. *The felts* are endless aprons of leather, which are substituted for cloth, as possessing many properties which render it superior to the latter article. Of these *felts* there are three, with their appropriate rollers; one of these is the feeding apron; the other two receive the cotton and carry it along from the ginning rollers, round which they pass. The upper apron inclines upward, and the lower apron downward; a part of the cotton adheres to the upper felt, but the larger portion of it to the lower one. *The clearer* is a frame worked up and down by a double crank shaft, having two combs attached to it, like those of the common carding machine, and serving, in a similar way, to remove the ginned cotton from the felts.

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42. For a *Machine for making Window Sash, Panel Doors, &c. &c.;* John Tichenor, Ithica, Tompkins county, New York, March 21.

Machinery for sawing, planing, sawing tenons, mortising and boreing, is described by the patentee, though in a very loose and indistinct manner. A claim is then made to "the before described machine for making window sash, panel doors, window blinds, &c., as a whole, and not its individual parts; but the general arrangement and construction of them to effect the above purposes."

A claim like this is sometimes a very good one, but this must, evidently, depend upon the ownership of the individual parts so combined together. If these are all public property, and I combine them in a new way so as to produce a new and useful result, the combination is my own; but there must in this case be something quite specific in the mode of combination. If, however, I take Mr. Woodworth's, or any other person's planing machine, and place it in company with other apparatus which I may legitimately use, neither justice or law will warrant my so doing. The patentee specifies his mode of planing to be by "a circular cylinder, with cast steel knives, or cutters, under which I pass the stuff to be planed, while the cutters are in rapid motion." This may serve as a general sample of the novelty of the invention which is claimed "as a whole."

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43. For improvements on the *Machine for Cutting Wooden Screws and Nuts;* Alexander Patton, Columbus, Franklin county, Ohio March 21.

The principal point claimed in the present patent is the cutting of the nut, or female screw, by turning the cutting shaft in a direction the reverse of that heretofore followed. A wooden screw, with a thread the size of that to be cut, is fixed in a frame, and passes through a tapped hole in it; the thread is turned off from the end of the shaft allowing it to pass through the bored piece in which a nut is to be formed, and to this the frame is firmly attached. On to the extreme end of the shaft, on the back side of the nut, is fitted a collar, carrying two or more V cutters; when by turning the screw, by means of a lever, in the manner of unscrewing "the Vs thus cut through, leaving as they cut the chips in the blocks cut. The improvement for which a patent is claimed consists in the cutting of the flutes of a nut by the reversed motion of the shaft, whereby the chips are left clear of the Vs. The facility of adding as many cutters as is thought proper, and the steady movement of the Vs by means of the nut and screw of the shaft."

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44. For a *Cooking Apparatus;* Thomas K. Anderson, Boston, Massachusetts, March 22.

The form of the part of this apparatus in which the fire is contained, is that of the common cylindrical stove, with its grate and ash pit. This cylinder is surrounded by a second, extending from the bottom of the former to about two-thirds of its height. This is made tight, to contain water in which to boil meat or vegetables. The top of the interior cylinder is surmounted by an oven, which is surrounded by a casing, for the conveyance of heated air and smoke, which must have an outlet at top. In this oven, baking, frying, stewing, &c. are to be performed.

" The inventor claims as his invention the combination of apparatus above described, and its arrangement for the purposes set forth."

We do not perceive upon the face of this arrangement any thing which recommends it to special favour. The cylindrical vessel in which meat and vegetables are to be boiled, is attached firmly to the stove, and the fluid must be drawn from it by means of cocks. It cannot be removed to be rinced and wiped by the cook, which, among those who are cleanly, is a point of some importance. The oven, or case, at top, is less *comeatable* than it ought to be, and in general it appears likely to give out too much of the odour of the good things before they are ready for the table; a defect very common in cooking stoves.

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45. For a *Mode of Manufacturing Leaden Pipes;* George W. Potter, Otsego, Otsego county, New York, March 23.

The apparatus which is the subject of this patent is intended to cast lead pipes of any required length, without the necessity of soldering separate pieces together.

The cast iron tube which forms the mould for the pipe is placed horizontally, and passes through a cast iron box which is to be supplied with cold water. The back end of this tube extends through

the water box, into another which is a receptable for melted lead. A core, the size of the bore of the tube, extends through it and into the reservoir, where it is supported by one end, without the necessity of any thing to sustain it, either within, or at the mouth of the tube. Above the cast iron reservoir of lead, there are two force pumps of iron, the pistons of which are made to operate alternately. When one of the pistons is raised, melted lead runs into the barrel, from a trough supplied for that purpose. At the bottom of each pump barrel there is a suitable valve, to prevent the return of the lead.

When the apparatus is used, it must, in all the parts containing fused lead, be surrounded by burning coals, so as to keep the metal in that state.

The claim is to "the pressing, or receiving the fused lead into a tube, around a rod, and cooling it in its passage through the tube, in the manner before described, and thus forming the pipe."

46. For an improvement in the *Plough;* Henry Spiehlman of Strasburg, and Daniel Miller, of Raphoe, Lancaster county, Pennsylvania, March 25.

The points stated to constitute the improvements, are the shape and construction of the mouldboard; the plate by which it is fastened to the plough, and a plate on the landside. The description is obscure in relation to each of these proposed improvements, and we are not told in what they differ from the like parts in other ploughs.

47. For an improvement in the mode of *Guiding all Endless Bands*, *Belts*, *or Aprons* while in motion; Samuel Sawyer, Boston, Massachusetts, March 30.

This is a simple, and, we have no doubt, an effective instrument. The endless band, or apron, passes over a roller, fixed in a suitable frame, and turning upon gudgeons. The frame has a centre pin on its lower side, which passes down into a hole, that allows the frame with its roller to swivel round. A shank, or rod, extends out at right angles from the frame of the roller, and at a suitable distance it is crossed by another piece forming two arms, parallel to, and of about the same length with, the roller. Each of these arms is bent over at the end, to receive and embrace the edges of the band, or apron. Should the band, in motion, now deviate either to one side or the other, its edge will press against the turned over end of one of the arms, which will immediately cant the roller, and right the band.

The whole is clearly explained, and distinctly represented in the drawing, but the specification refers to the model, which it claims as making a part of the patent.

48. For an improvement in the mode of *Cleaning and Ginning Cotton Wool*, and freeing it from the seeds, &c.; Samuel Sawyer, Boston, Massachusetts, March 30.

Between the two rollers, fixed in the manner of the ordinary roller gin, there is a third smaller roller, with its centres forward of them,

and occupying nearly the whole of the gripe between them. Around this smaller roller passes an endless apron, and as the cotton is fed to, and drawn in forcibly between the gin rollers, the minuteness of the spaces causes all seeds and other hard substances to be completely squeezed out, whilst the cotton is carried in upon the endless apron, and is taken off by a revolving belt cleaner. The guide roller, described in the specification last referred to, is applied to the endless apron in this machine.

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49. For an *Improvement in his method of Cleaning or Ginning Cotton Wool;* Samuel Sawyer, Boston, Massachusetts, March 30.

This improvement consists in applying a plate, or blade, of metal or wood, in contact, or nearly so, with the small roller carrying the apron, as described in the last specification. The cotton being fed between the blade and the roller, is drawn in, and the seeds, &c. completely excluded. This blade, which is called a preventer, it is observed, may be advantageously applied to the common roller gin.

There is a strong resemblance in the principle of operation, though but little in the mode of fixture, between this blade and the guard mentioned as applied to the roller gin of the Messrs. Whittemore, No. 41.

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50. For a mode of *Combining Rollers, with a connecting Belt, or Apron, whereby Fleece, or Skin Wool, may be held or strained over a surface, so that foreign substances may be removed;* Samuel Sawyer, Boston, Massachusetts, March 30.

An endless apron is held up against a fluted roller, by two small rollers, over which it passes. The fluted roller allows burs, or other foreign substances to pass between it and the apron without being crushed, and as the fleece passes over the smaller rollers, every thing of the kind is exhibited to view, and readily brushed or knocked off. We should make our description much too prolix were we to attempt a verbal explanation of the whole arrangement of this machinery. The guide roller is applied to the endless apron of the machine.

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51. For machinery for *Cleaning Animal Wool, &c.;* Samuel Couillon, jr., Boston, Massachusetts, March 30.

The specification of this patent extends over eleven closely written pages, which might, however, be reduced to two, if the repetitions and other redundancies were pruned away. We shall not attempt an analysis of the specification, and even the claim itself we shall condense very much. The former informs us that the object of the invention is the cleaning of animal wool from foreign substances, in the fleece, or otherwise; and that for this purpose the fibres of said wool are to be straightened in such a manner as to bring the burs or other foreign materials on the surface, when they are to be removed

"by scraping, cutting, pinching, blowing, or striking them off, as hereinbefore specified."

A further claim is to the mechanical arrangement of his machine, as described, with the exception of two small drawing rollers, invented by Samuel Sawyer, and used with his approbation.

The fleece is stretched by means of fluted, or other, rollers, over and between which it passes; from them it is drawn against a straight metallic edge, in passing which, the fleece is beaten by a revolving beater having projections on it, which serve to disentangle the fibres, to straighten them, and remove the foreign substances.

There appears to be considerable resemblance between this machine and that last described, not only as regards the object in view, but also in the mode of accomplishing it.

SPECIFICATIONS OF AMERICAN PATENTS.

Description of the Pennsylvania Edge Rail and Chair, for which a patent was granted to W. B. MITCHELL, *of the city of Philadelphia, February 27th,* 1833.*

TO THE EDITOR OF THE JOURNAL OF THE FRANKLIN INSTITUTE.

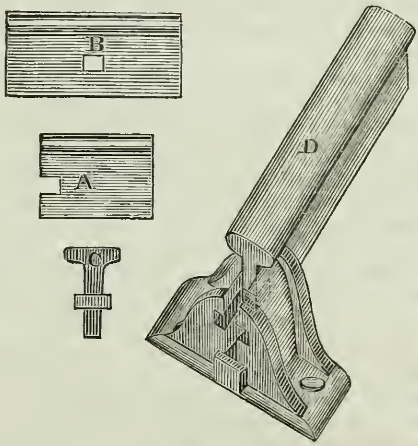
SIR,—I have just received your communication requesting me to furnish for publication in the Journal of the Franklin Institute, a description of the "Pennsylvania edge rail and chair."

In order that the objects which are endeavoured to be effected in the formation of this rail and chair, may be better understood, I shall in the first place point out some of the defects which have been discovered in the use of what is generally termed the "Clarence" rail. In a climate subject to so much variation in temperature as that of Pennsylvania, it is found that the expansion and contraction of the metal, very materially affects the fastenings of the Clarence rail in its chairs; the rail being more immediately exposed to the action of heat and cold, than the base of the chair, it follows that the expansion or contraction of the rail takes place, before a corresponding action is produced on the base of the chair. If the wedges in the Clarence rail be driven in extreme warm weather, they gradually become slack, as the temperature changes, and require almost constant attention in driving them, until the lowest degree of temperature takes place, at which time, if the wedges are driven perfectly tight, danger will result from the subsequent expansion of the rail, bursting off the jaw of the chair, before it can relieve itself by a corresponding expansion.

The wedges of the Clarence rail being exposed, are subject to drop out, or are easily removed by those who are disposed to do mischief. To remedy these and other defects, the "Pennsylvania Edge Rail

* It was intended to have published the specification of this patent, but the patentee has furnished the accompanying description, which will probably be more satisfactory than the official instrument itself.

and Chair" have been devised. In the construction of the rail, (with a view to economy,) such form was adopted as to give it the greatest degree of strength with the least weight of metal. It has a cap tread of the usual dimensions, but instead of a rib and *keel*, it is furnished with a rib only, and extending to such depth as will render it capable of supporting any required weight; the thickness of the rib not being increased beyond what is necessary to prevent its kinking by the weight which it is calculated to bear, (see drawing C.) At each end of the rail, about midway of the rib, is a notch, (see drawing A,) so that when the ends of two rails are placed together, the notches correspond and receive a key driven transversely of the rails, and extending outwards at each end, about half an inch—at the intermediate points of support in each rail are mortises through the rib to receive keys, similar to those at the joinings.



A. End of rail at junction.
B. At intermediate bearing.
C. End view with key.
D. Perspective view of rail and chair.

The exterior of the chair is similar in form to the Clarence chair; in the interior faces, on each chair, are grooves extending about two-thirds through the chair, longitudinally, and calculated for the reception of the keys already described; so that when the chairs are bolted to their supports, and the keys placed, the rail may be dropped into the chairs, and by being drawn longitudinally the keys will enter the grooves in the interior face of the chairs, and thus remain perfectly secure from external violence; the keys being made to fit the grooves, the rail remains perfectly firm and steady in its chairs, without the aid of wedges, and the strain and consequent reduction of strength in the chair, caused by driving the wedges, is altogether avoided. The key at the joining as it enters into both rails, preserves the vertical position of the joint, the want of which is so obvious to those who have travelled upon rail-ways secured by wedges only.

Very respectfully, yours,

W. B. MITCHELL.

Columbia and Philadelphia Rail-way Office, August 20th, 1833.

ENGLISH PATENTS.

To Samuel Jones, *manufacturer, for his invention of a certain improvement, or certain improvements, in apparatus, or part, or parts, of apparatus, for producing instantaneous light. Sealed 20th November*, 1832.

This invention applies to the mode or manner of making, manufacturing, or constructing of the matches to be used for producing instantaneous light, which said improved matches may be ignited by dipping the prepared ends in sulphuric acid contained in a bottle, as in common use; or they may be ignited by friction, produced by drawing the prepared end of the match between the rough surfaces of a piece of sand, glass, or emery paper; or in contact with any rough surface or body, which will produce sufficient friction to cause the combustion.

The said matches are intended to burn with a blaze or flame, similar to such as are used to light candles; or to burn with a slow or moulderingfire, as fusees, for the purpose of lighting cigars, pipes, &c.; and consist, first, in constructing, making, or forming the matches out of strips of cotton, linen, hemp, flax, tow, or other fibrous material, previously wove into cloth, or tape, or what is commonly called inkle; or from threads of linen flax, hemp, or tow, twisted or combined together; which strips of cloth, tape, or inkle, or combined threads, are to be covered or saturated with a coating of wax, resin, spermaceti, tallow, or any compound of them, which will burn with a blaze or flame, and answer the purpose intended.

The tapes, or strips of cloth, or combined threads, may be saturated or coated with the composition, by drawing them through a quantity of such inflammable material in a liquid state placed in a vessel; or it may be applied to the tapes, cloth, or combined threads, by hand with a brush, or in any other convenient manner. The tapes, or strips of cloth, or combined threads, being thus prepared with the inflammable material, are to be cut into suitable lengths required for the matches, and their ends primed or charged with a composition of chlorate of potash, compounded or mixed with antimony in combination with sulphur, (commonly called or known by the name of sulphuret of antimony,) or such other chemical compound as will ignite by friction, and answer the purpose; which said compound of chlorate of potash and sulphuret of antimony is to be mixed with a mucilage of gums, starch, flour, or glue, to render it sufficiently tenacious, so as to adhere to the ends of the strips of cloth, or tapes, or combined threads, which ends may, or may not, be previously prepared for the compound by dipping them in hot liquid sulphur, as may seem requisite. These matches are intended to be ignited by drawing the prepared end between the surface of sand paper, &c. as before stated.

Secondly, in making or manufacturing matches out of strips of paper, strips of cotton, or linen cloth, or tape, or inkle, or from threads

of linen, hemp, flax, or tow, combined, also from strips or pieces of wood, scale board, or shavings, all which said materials are to be saturated with a solution of nitrate or chlorate of potash, or any other chemical composition, which will cause them, when ignited, to burn with a slow or smouldering fire, as fusees. The materials, either before or after being prepared with the solution of nitrate or chlorate of potash, are to be cut into proper lengths for the matches; and when prepared with the solution, the ends are to be charged or primed with the foregoing compound of chlorate of potash and sulphuret of antimony, or any other chemical compound or composition which will ignite by friction, as before stated; and which matches, when so ignited, will not continue to blaze, but burn with a slow or smouldering fire, as fusees.

And thirdly, in making or manufacturing of matches from strips of wood, scale board, or shavings, or strips of wood, scale board, or shavings, covered with paper. Such said materials are to be saturated with a solution of nitrate, or chlorate, of potash, or any other chemical composition which will cause them to burn with a slow or smouldering fire, as fusees; which saturation may be effected either before or after the materials are cut into strips of the convenient size for matches.

The ends of the matches are then primed or charged with a composition or compound of chlorate of potash, mixed with camphor, sulphur, inflammable gums, or resins, farinaceous powders, powder produced from fungi, woods, bark, or vegetable fibre; or with vegetable sugars, and prepared or compounded with mucilage as above described, and in such proportions as will be found most convenient, or with any such other chemical compound as will ignite when brought into contact with sulphuric acid.

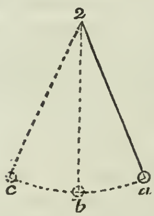
Having now described the nature of my said invention, and in what manner the same is to be performed, I wish it to be understood that I do not mean or intend to claim as my invention, any of the within named chemical compounds or compositions; nor do I claim the use of cotton threads or yarn, in the making of my improved matches, except when woven into cloth, tape, or inkle; but I do hereby claim as my invention, first, the making or manufacturing of matches from strips of cloth, or tape, or inkle, formed or woven from threads of cotton, linen, hemp, flax, tow, or other fibrous material; or from threads of linen, flax, hemp, or tow, twisted or combined together; which said materials are to be saturated or coated with the inflammable composition as before stated, to burn with a flame or blaze, and to be charged or primed so as to be ignited by friction. Secondly, in making or manufacturing matches from strips of paper, cotton, or linen cloth, tape, or inkle, wood, scale board, or shavings, or from threads of linen, hemp, flax, or tow, twisted or combined together, which materials are to be saturated with a solution of nitrate or chlorate of potash, or such other chemical composition as will cause them to burn with a slow or smouldering fire, as fusees, the ends of the matches being also primed to ignite by friction; and thirdly, in making matches from strips of wood, scale board, or shavings, either in

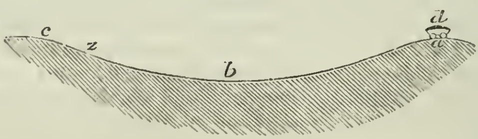
conjunction or not, with paper, and saturated with a solution of nitrate or chlorate of potash, or such other chemical composition as will cause them to burn with a slow or smouldering fire, and to be ignited by the action of sulphuric acid upon the priming, or charge, placed upon the ends of the matches.

[*Lond. Jour.*

To RICHARD BADNALL, *for his invention of an improvement in the construction or formation of the trams, or rails, or lines of rail, or tram-roads, upon which locomotive engines shall or may work. Sealed* 8*th September*, 1832.

This improvement in the construction or formation of the trams, or rails, or lines of rail, or tram roads, upon which locomotive engines shall or may work, will be best illustrated by reference to the oscillation of a pendulum. If a plummet suspended by a string from the point 2, be drawn away from the perpendicular line to the point *a*, and there let go, it will fall by its gravity to *b*, in the arc *a b*, but on its falling it will have acquired so much momentum as will carry it forward up to a similar altitude at point *c*. Let it be supposed that a line of rails or tram-way for carriages be so constructed from the summit of two hills across a valley, that the descent from the one hill as *a*, to the valley *b*, shall subtend a similar angle from the horizontal line, to the ascent up the other hill from *b* to *c*. Now if a tram wagon, as *d*, be placed at the summit of the





declivity *a*, it will, by its gravity alone, run down the descending line of rails to the lowest point *b*, but in so running, according to the principles of the oscillating pendulum, it should have acquired a momentum that would carry it forward without any additional force up the ascending line to the summit of the hill *c*, being at the same altitude as the hill *a*.

It is quite certain that this would really take place if the velocity of the momentum was not impeded by the friction of the wheels of the carriage upon their axles, and upon the rails on which they run. Hence, subtracting the amount of friction as a retarding force from the momentum which the carriage has acquired in descending from *a* to *b*, it will be perceived that the momentum alone would only impel the carriage part of the way up the ascent *b c*, say as far as *z*.

The patentee states in further explanation of his invention, that

"it will now be perceived that the carriage *d*, would not only pass down the descending line of road from *a* to *b* by its gravity, but that the momentum acquired in the descent would also impel it up the second hill as far as *z*, unassisted by any locomotive power. In order, therefore to raise the carriage to the top of the second hill, I have only to employ such an impelling force as would be sufficient to drive it from *z* to *c*, the whole expense of locomotive power for bringing the carriage from *a* to *z* being saved."

"If, now, I employ a small locomotive power to impel my carriage from *a* to *b*, I by that means obtain a greater momentum than would result from the descent of the carriage by gravity alone, and I am therefore enabled by that means to surmount the hill *b c*, having travelled the whole distance from *b* to *c* on the undulating line of road with much less locomotive power than would have been requisite to have impelled the carriage the same distance upon a perfectly horizontal plane.

"Having now set out the principles upon which my improvement in the construction of tram roads, or rail-ways are founded, I desire it to be understood that I claim as the subject of my invention the forming of trams or rails, or lines of rails, or tram roads, in such an undulating curve or curves as will enable me to combine the advantages of momentum from gravity when running down the descending curves of hills, with the power of locomotive engines to be employed thereon; I do not confine myself to any particular extent of line, or form of curve, but vary and adapt the curve or curves according to the surface of the country, or the local circumstances."

[*Ibid.*

Patent granted to RICHARD WHYTOCK, *for an improved method or manufacture which facilitates the production of regular figures or patterns on different fabrics, particularly velvet, velvet pile, and Brussels, Wilton, or Turkey Carpets. Dated September* 18, 1832.

We have, at length, quitted the hardware and iron, which have been the subject of our previous notices, and find in Mr. Whytock's patent a matter of more interest, if not of more importance. The object the patentee has in view is to prevent waste, and to make the common loom applicable to all the purposes of what is called the figure loom.

Instead, therefore, of using a variety of different coloured yarns, either in the warp or woof of his velvet or carpet manufacture for the looping in the Wilton carpets, and for the knotting in the Turkey carpets, he uses but one yarn, all coloured at the same time, and by a process of some novelty.

He provides himself with a huge tumbril or cylinder, revolving on a horizontal axis like the common grindstone, (this is the patentee's own simile;) at the extremity of the axis is fastened a pulley, which corresponds with another pulley, secured to the wooden frame that

supports the cylinder. These are connected by an endless strap; and to the pulley in the frame is attached a regulating, or directing screw, the motion of which is simultaneous with that of the cylinder.

To the foot of the frame, and rising to the level of the outer disk of the cylinder, is a rack containing spindles, on which are placed reels of yarn, of the quality of which the carpet is to be composed, or for any other fabric. If the ground of the subject is to be white, the yarn on these reels is white; if of any other colour the yarn is dyed of that colour before it is wound on these reels. The cylinder is covered with a blanket, and then with an oil cloth, and the yarn for each spindle is drawn through loop holes of wire in the rack, and through eyes in the directing screw, or regulator; thence they are led to the cylinder, and carefully attached to the oil skin; the cylinder is then turned slowly and carefully until the yarn is wound on its whole surface, in suchwise that the threads shall lie as regularly as possible, not touching each other, and yet "*only not*" touching; as close almost as contact.

When the cylinder is quite filled with the yarn, the ends are again carefully fastened to the oil cloth, and colours are laid on by means of rulers, or spars buffed with felt, as used by the figure workers or block printers. The felt surfaces of these rulers are dipped in the colour sieve, as is well known to the operators, and it is laid on the yarn, as wound on the cylinder, at regulated distances and in exact proportions.

These proportions are to be ascertained only by a pattern paper, divided into squares, say seventy-four at top and one hundred and four down the side. On the paper thus squared out, is drawn the pattern; and the yarn on the cylinder, being the perpendicular lines, the transverse horizontal lines are marked down the side of the cylinder, as a kind of key. The operator then carefully observes, how many squares of his pattern are left blank, and these he leaves so. He then counts the number of squares in the first line that are to receive a colour, say light blue, and he then applies his ruler with the felt edge dipped in the colour, and so colours the yarn at once. When he has done this he turns the cylinder until the next numbers that require the colour are uppermost, and he again applies his felt ruler, and so on until the pattern is completed. The yarn is then taken off the cylinder on the oil cloth, which is removed at the same time, and when the colour has dried, the yarn is washed, and is afterwards exposed to the process of steam drying, according to the usual method. When all the yarn is thus prepared, it is beamed for the loom, and the woof is ready. The warp is prepared to correspond, and the whole process of carpet making, or of velvet weaving, proceeds in the common loom without the laborious manipulations, the waste, and the delay of the figure loom.

There is much of the process old, great part of it new, and the modification is altogether so. The patentee claims merely the means by which the common loom may be made to produce all the effects of the figure loom, particularly the cylinder, the colouring, and the directing rack. [*Rep. Pat. Inv.*

Patent granted to John Swan, *Brewer, for certain improvements in Brewing. Dated September* 29, 1832.

The object of this invention is to procure useful ingredients for brewing from hops which have already yielded their essence in the ordinary degree. The means of accomplishing this end is by a very high pressure, and by cutting and bruising the hops, in order that they may be subjected to repeated pressure. This effect may be produced in many ways. Mr. Swan proposes a press of very great power, to be secured in a room capable of being used as part of a brew house. The press must be strongly fixed to the floor. It works in a rim of proper material secured within another. From this outer circle proceeds a pipe to conduct the liquid expressed, from the hops into the proper receptacle.

The press is of great weight, and its bottom is convex, and scored in channels, as is the bottom of the vessel in which it works. These channels are to allow the liquid to pass off. The lever by which the press is raised may be worked by hand, or by machinery. The vessel being filled with hops which have undergone the usual process of brewing, the press is made to work upon them, and the liquor is forced off into the conducting pipe. Yeast is submitted to a pressure in the same manner, and forced into cakes for the convenience of keeping. The claim is for the very high pressure, and for this means of applying it. [*Ibid.*

Patent granted to George F. Muntz, *Metal Roller, for his invention of an improved manufacture of Metal Plates, for Sheathing the Bottoms of Ships and other Vessels. Dated October* 22, 1832.

The patentee takes, what is called in the market, the "best selected copper," and of zinc, that which is called in English commerce, "foreign zinc;" and these ingredients must be as fifty parts of copper to fifty parts of zinc, deviating according to the qualities of the ingredients, or to the purpose of the amalgamation, to sixty-seven parts of copper and thirty-three parts of zinc. The happiest medium between these extremes, according to the experience of the inventor, is of copper fifty-seven parts, and of zinc forty-three parts. If the zinc prevail, the metal is rather snappish than ductile; if the proportion of copper be exaggerated, the combination is apt to fuse in its after processes. Again, the quality of these ores will vary materially. You may mix copper and calamine, but you cannot then so readily decide on the proportions: brass, with a little addition of zinc, may be used also, but here again is less certainty. Between the extremes given, and about the medium suggested, the manufacturer will find by experience, that the nature of the different ingredients is most favourable to his purpose. When the new metal is produced by the combination mentioned, it is cast into ingots of different weights according to circumstances. These ingots are heated to a

red heat, and carried through the rollers: but with all circumspection, for if too much heated, there will be fusion; if allowed to grow cold the new amalgam cracks. If too hot, then do not roll it at all, for your labour will be wasted. Let it return to its own state. If too cold, roll it notwithstanding, but roll it thick, and then roll it again, when quite cold, with a cold roller.

The new metal, with such care in the process, works easily and cheaply: it is sufficiently flexible to adapt itself readily to the ship's outline, and it is more durable than the copper now used. It suffers less from oxidation, and yet it is oxidized enough to keep the vessel's bottom clean. The cheapness and utility depending, in a very great degree, on the skill with which it is attended to, wherein our British artists are so famous. [*Ibid.*

Patent granted to WILLIAM W. TAYLOR, *Felt Manufacturer, for his invention of an improved Cloth for the Sails of Ships and other Vessels. Dated November* 8, 1832.

The inventor observing that sails of flax or hemp invariably suffer from exposure to the moisture of the atmosphere and the wear of the waves, has set himself to invent a better material of which to make sails. In his own manufacture he found an article, little valued, except occasionally to be introduced in the composition of felt, sometimes to stuff upholstery articles with, and, much more generally, to be mixed with sand and lime in the making of mortar. The article is called in the markets, ox and cow hair. Of this hair the new fabric is wrought. The inventor takes of this material, and has it carded and combed as he would wool, so as to have the staple of the hair laying as straight as possible. The hair is spun precisely as wool, cotton, or flax. Hitherto this part of the process has been accomplished by hand, and the workwomen have found in it no difficulty. When the thread is made, the patentee recommends that it be doubled both for warp and woof. The two threads, twisted together, are woven in a hand loom, with all the facility of the common sail cloth. It is then fulled and milled so as to make the parts adhere, and to fill the interstices. The sails are sewed with the hair-thread, and thus the whole material is totally impervious to wet, insensible to damp, and will not suffer in any climate. The whole of the manufacture and the preparation are precisely correspondent with those of sail cloth as now used.

The patentee claims nothing in the machinery, or the mode of preparation; his part is the invention and application of such a fabric to such a purpose. Elk hair, deer hair, and the short straight pile of horse hair might be used; but the ox and cow hair of the market is cheaper and more plentiful. Mildew will not affect the sail, and it will stand the wind even better than canvass does.

[*Ibid.*

¶ List of French Patents.

A List of Patents for Inventions, Improvements, and the introduction of Foreign Inventions or Improvements, granted in France during the first quarter of the year 1832.*

[Continued from p. 115.]

[TRANSLATED FOR THIS JOURNAL.†]

Peter Harris Abbot, of London, represented at Paris by M. de Moleon, March 28, (15 years.) For an improvement in the vaporization of liquids, applicable to the generation of steam and to other purposes. (P. Invent. and Improv.)

Jacques Marie Agneray, mechanician, at Roan, March 28, (5 years.) For a machine called a stretching and compressing bench, intended to be used in the preparatory processes in the spinning of cotton and other fibrous materials. (P. Invent.)

André Koechlin & Co. of Mulhausen, Department of the Upper Rhine, March 28, (5 years.) For a new method of spinning and twisting, by a continuous process, cotton, wool, or any other filamentous substance. (P. Improv.)

Ardaillon Bessy & Co. and John Lallier Forest, residing at Saint Etienne, Department of the Loire, March 9, (5 years.) For a process of manufacturing simultaneously a number of plain and damask bands, to be applied to the barrels of fowling pieces. (P. Invent.)

Ardaillon Bessy & Co. and John Lallier Forest, residing at Saint Etienne, department of the Loire, March 31, (5 years.) For an improved process for manufacturing simultaneously a number of plain and damask bands, to be applied to the barrels of fowling pieces. (P. Improv.)

John Anthony Arnaud, manufacturer of silk stuffs, at Lyons, January 23, (5 years.) For various processes intended to prevent the embezzlement of silk by the dyers. (P. Invent.)

John Anthony Arnaud, a clerk of Messrs. Royer & Co. at Saint Etienne, Department of the Loire, March 26, (5 years.) For certain economical methods of arranging the pasteboards which form the designs on the machines *à la Jacquart.* (P. Improv.)

John Baptiste Aubaud, Paris, March 9, (15 years.) For a machine for baking bread by stone coal. (P. Improv.)

Edward Baccuet, Paris, January 26, (5 years.) For a mechanical counter, intended to show the number of passengers who may have entered a public stage. (P. Invent.)

Edward Baccuel, Paris, February 29, (5 years.) For a mechani-

* In the following list P. Invent. denotes a patent for an invention. P. Invent. and Improv. a patent for invention and improvement. P. Improv. a patent for an improvement. P. Import. a patent for the importation, or introduction of a foreign invention. P. Import. Improv. a patent for introduction and improvements. P. Invent. Import. a patent for invention and importation.

† By request of the Committee on Publications.

cal counter, intended to show the number of passengers who may have entered a public stage. (P. Improv.)

Peter Bernard Barrau, Paris, March 16, (10 years.) For a handy, expeditious, and economical machine for sowing grain, &c. (P. Improv.)

Nicholas Francis Bert, Paris, January 9, (10 years.) For a portable steam bath. (P. Invent.)

Marcus Blanchon, jr. merchant and machine maker, at Chomerac, Department of Ardeche, January 14, (5 years.) For a mechanism which he calls *coupe-mariage*, for spinning silk without the aid of a reel. (P. Improv.)

John Baptist Baurges, sugar refiner, Bordeaux, March 28, (5 years.) For an apparatus for clarifying sirops. (P. Improv.)

Sylvan Toussaint Bourlet d' Amboise, agriculturalist, Paris, March 9, (5 years.) For the manufacturing of powdered *Rakachou*, and of the flower of the Asiatic sweet acorn, improved. (P. Import. and Improv.)

Sulpitius Christopher Breuzin, lamp maker, Paris, March 31, (5 years.) For an eolipile fed with spirits of wine, and affording a vertical jet of flame. (P. Invent. and Improv.)

Lewis Brurier, architect, Paris, March 28, (15 years.) For a hydraulic machine, called by him a Continual Hydrometer. (P. Improv.)

Christopher Francis Calla, engineer, mechanician, and founder, Paris, February 29, (5 years.) For improved spouts for carrying off water under the streets. (P. Invent. and Improv.)

John Baptist Cantier, suspender manufactory, Paris, February 11, (5 years.) For a new instrument to cut Indian rubber or caoutchouc, in its natural state. (P. Invent.)

John Claudius Chabert, philologist, and Lewis Legris, mechanician, Paris, March 14, (10 years.) For a portable windmill. (P. Improv.)

George Marcus Chapman, of New York, represented at Paris by M. Perpignan, February 13, (10 years.) For *antegazogenous* lamp sockets. (P. Import. and Improv.)

Mary Alexander Collet, lamp maker, Paris, March 26, (5 years.) For a carriage lamp which he calls Preservative Lamp. (P. Inven. and Improv.)

John Benjamin Coquatrix, suspender manufacturer at Roan, March 28, (10 years.) For a mechanism to be substituted for steam power, and to be applied to the same purposes. (P. Improv.)

Augustin Coront, silk dresser and trader residing at Lyons, March 31, (5 years.) For a new mechanism adapted to the dressing of raw silk. (P. Invent.)

Peter-es-Liens Courties, and Charles Lassere, physicians, Paris, January 31, (5 years.) For a rattle, intended to facilitate dentition, (P. Invent.)

Alexander Darlu, Paris, March 31, (10 years.) For a new machine which he calls a rotator. (P. Invent.)

John Simeon Delaroche, chimney builder, Paris, January 14, (5

years.) For a new hearth with circulation of air, and serving as an economical back log. (P. Invent and Improv.)

Peter Theophilus Delarue, lithographic printer, Paris, February 13, (5 years.) For a machine intended as a substitute for ventilators, by imparting a circular motion to the sky lights. (Patent Invent. and Improv.)

Augustus Delavelege, civil engineer, Paris, March 31, (10 years.) For a new lamp, by him called a Phœnix lamp. (P. Invent and Improv.)

Deroche and Magnin, merchants, Lyons, March 28, (5 years.) For pressed leather canteens, rendered impervious to water by a peculiar preparation. (P. Invent.)

Felix Nicholas Durand, machine maker at Somedienne, Department of the Meuse, January 14, (5 years.) For a powder flask and priming wire in one. (P. Invent.)

The Baron D'Est, Paris, February 22, (10 years.) For a new process of manufacturing all sorts of fire arms, as pistols, carbines, muskets, and a new kind of cartridge. (P. Invent and improv.)

Anthony Fayard, apothecary, Paris, January 23, (5 years.) For a new warming pan, heated by boiling water. (P. Improv.)

Edm. Nicholas P. Favreau, mechanical engineer, Paris, February 11, (15 years.) A machine for manufacturing the different kinds of paper. (P. Invent.)

Lewis Edward Feulard, Paris, February 13, (15 years.) For a machine to grind corn, and to pulverize various substances. (P. Invent and Improv.)

John Fontenelle, Paris, March 28, (5 years.) For employing metallic cloth in the manufacture of sieves for sifting corn. (P. Invent. and Improv.)

Lewis de Coblentz Gall, residing in Paris, January 23, (5 years.) For a warming and sudorific apparatus intended to warm the cold surfaces of a patient lying in his bed; to excite a prompt and copious perspiration, and also to communicate to the bed a perfume as well as warmth. (P. Invent. and improv.)

Peter John Gaudin, dyer, of Lyons, residing in Paris, March 26, (10 years.) For new processes of dying by mechanical means. (P. Invent and Improv.)

[TO BE CONTINUED.]

Account of an apparatus for maintaining a uniform temperature.

By GEORGE MERRYWEATHER, *Esq. of Whitby.*

(Read before the Royal Society of Edinburgh.)

I have the honour this evening of presenting to the Royal Society an apparatus which I hope will be the means of solving an important problem that has long remained an insurmountable obstacle in the path of science.

When the French chemists promulgated their nomenclature to the world, Fourcroy published the following:—

"Heat is now regarded only as an auxiliary agent, by which combinations are forwarded. As it is employed in different degrees, it would be a valuable acquisition if we knew how to apply it with uniform intensity. A furnace of this kind has long been a desideratum among chemists, and the manipulations of artists have hitherto been the only guide to the chemist, but it is impossible by this means to have the degree of precision so much to be desired."

It is nearly half a century since Fourcroy wrote the above, since which time the most gigantic progress has been made in science; yet this important point appears to have been lost sight of, or has been considered, like perpetual motion, an object never to be attained. Indeed, when we reflect that fires and furnaces are constantly consuming, and must be constantly renovated with fuel, and when we consider that flame must ever be in agitation, from the very atmosphere from which it derives its existence, it is not astonishing that all attempts should have proved futile, to arrive at a steady temperature, for a length of time, by these means.

The mode which I have made use of to arrive at the solution of the difficulty is quite novel, and will be best understood when the apparatus is before the Royal Society, when all the minutiæ can be explained.

In a philosophical point of view, I trust this apparatus will be considered interesting, as proving the fact that a uniform temperature *can* be steadily maintained in despite of external influences; and that it can be kept in constant operation, for an indefinite period, without requiring any one to attend to it.

It remains for scientific men to prove what its utility may be in chemistry and in pharmacy; and whether phenomena, at present unknown, may not be produced by submitting different substances for a length of time to the uniform temperature that this apparatus will maintain. Boerhaave first produced the red oxide by keeping mercury at the steadiest temperature he could procure for many weeks.

I rather anticipate an objection that may be made to this furnace, that is, the expense of the spirit consumed: but every one who has observed the constant attendance and watchings which every process requires where fire is employed, will easily perceive that what is expended in spirit will be more than economised in time. It will, I hope, be sufficiently obvious, that, in conducting experiments by this apparatus, there will be no fires to mend—no chimneys to sweep (as it causes no smoke;) and, from the precision of temperature, there will be no danger of explosions or boilings over. For instance, a practitioner may commence his process of distillation in the morning, he may attend to the calls of his profession, and be satisfied during his absence that all is going on steadily. But, as the expense of all processes is an important consideration, I have been induced to make the following calculation:—I find that one gallon of spirit, twenty-two over proof, which cost nine shillings from the distiller, will keep one of the balls incandescent for two months, night and day; or a fraction less than a penny for twelve hours. Three burners cause a temperature of 160 degrees of Fahrenheit; six produce a temperature

of 215 degrees; therefore, the expense of supporting the former for twelve hours will be 3d. and the latter 6d. The apparatus, which is at present before the Royal Society, has fifteen burners, elevating the temperature to nearly 396 degrees, making the expense 1s. 3d. for the same period.

I am indebted to Dr. Duncan, the Professor of Materia Medica, for suggesting to me the amount of temperature I have produced this evening before the Royal Society. And I have no doubt, if it had been necessary, I could have produced a temperature of 1000°; but I am informed that a heat of 300° to 350° is the most desirable temperature.

It perhaps will be expected that I should give an analytical account of the process of combustion, but this I leave with deference to the more refined chemist, and I will only venture the conjecture that it will be found, that the intense heat, produced by the employment of such small bodies, results from the combustion of oxygen and hydrogen by means of the spongy platina, and that water will be found to be the product, mingled with a portion of acetic acid, and derived from the spirit.

As my attention was first drawn to this subject by the writings of a French philosopher, I feel some degree of pleasure in thinking, that when this apparatus is made known to the scientific men in France and on the continent, it will be freed from the objection of expense, which, in this kingdom, may prove an obstacle, but, in other European states, the expense will be a mere bagatelle.

I do not present this furnace to the Royal Society as a perfect apparatus, because I am aware that it admits of various improvements and modifications. My sole object has been to produce a uniform and lasting temperature; and the means by which I have accomplished this, I have endeavoured to render as simple and as little expensive as possible.

George Merryweather.

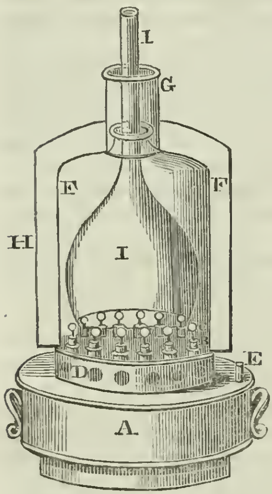
Explanation of the engraving of the apparatus for maintaining uniform temperature.

A, a reservoir made of tin, nine inches in diameter, concave at the bottom interiorly, and deep enough to hold one gallon of spirit. The hole at the side and lower part is to connect, by means of a tube, the reservoir with one containing a larger supply of spirit. This extra supply will be necessary when an experiment is to be conducted for a length of time.

B are the cotton wicks, which perforate fifteen brass tubes, each of which is similar to the brass work accompanying a common spirit lamp. When the wick is drawn through, it is to be spread and flattened. Each wick is to be sufficiently long to touch the bottom of the reservoir. The fifteen brass tubes are to be inserted into fifteen tin tubes, three quarters of an inch in diameter, which are soldered to the top of the reservoir; namely, twelve in a circle, and three in the

centre, the latter to be shorter and lower than the former, in order that a globular retort may approximate equally to each wick.

C is the platina wire, about the hundredth part of an inch in diameter, coiled into the form of a cup, the upper part of which is one-third of an inch in diameter; this cup is supported by a pin, formed by a continuation of the wire. A large headed common pin is pricked into the centre of the wick to make an opening for the insertion of the pin of the wire cup. The head of the large pin is then placed in the bottom of the cup to depress it, nearly in contact, but not to touch the wick. When all the coils of wire have been thus arranged, a piece of well compressed spongy platina is to be cut into small blocks of sufficient size to rest in each wire cup.



D is a rim soldered to the top of the reservoir, perforated with twelve holes, each three-quarters of an inch in diameter, for the admission of air.

E is a tin tube for supplying the reservoir with spirit.

F is a glass cover with a wide neck (this glass is precisely similar to the common deflagrating jars;) and rests upon a tin ledge, soldered inside round the rim D, above the air holes:

G is a tin tube or chimney, which rests upon the shoulders of the glass cover F.

H is a screen made of tin, which is large enough to surround the glass cover, and to leave a space an inch distant all round it. This screen is supported by a projecting rim of tin at the bottom on the same ledge that the glass cover F rests upon. It is advisable to have the interior surface of this screen lined with some material that is a bad conductor of heat.

I is a glass flask or retort, rounded at the bottom, which is placed upon a brass ring, supported by three legs. It is necessary to have all retorts that are used perfectly rounded at the lower part, in order that when the apparatus is adjusted, the retort may be at an equal distance, not to touch, but to be nearly in contact with each of the platina balls.

Belonging to the furnace is a tin cover, which is used when the apparatus is at rest. The screen and glass cover are withdrawn, and a tin cover is placed over all the burners, and rests upon the top of the reservoir, covering the rim perforated with air holes. The tin serves as an extinguisher, prevents the spontaneous evaporation of the spirit, protects the platina balls from injury, and preserves all clean. The whole of the tin work is japanned externally.

When an experiment is about to be performed, the tube G is taken off, then the screen H, afterwards the glass cover F. The wicks are

then to be saturated, by dropping strong alcohol upon each of them, after which they are to be lighted; in a few seconds the platina balls become red hot, the flame is then blown out, the retort, with its contents, is fixed on the brass stand, which is placed within the circle of the twelve burners. Then the glass cover, screen, and tube, are replaced as before.

The best and neatest mode of setting the apparatus into operation, is to render each of the platina balls incandescent, by means of the blow-pipe and spirit lamp; as soon as the balls are red hot the vapour of the spirit is ignited, and renders the dropping of stronger alcohol quite unnecessary. For this suggestion I am indebted to Professor Christison.

When it is wished to excite a lower degree of temperature, the experimenter has only to withdraw some of the brass tubes, in doing which he takes away at the same time the wicks and platina balls; corks must then be placed in the tin tubes, to prevent the unnecessary evaporation of the spirit. [*New Edinburgh Philos. Jour.*

Observations on competitions among working tradesmen. By Wm. Grierson, *Esq. of Garrock, W. S. member of the Society of Arts. Abridged from a paper read before the Society* 10*th April,* 1833, *and by their committee recommended to be printed.*

All of the useful arts admit of two distinct kinds of improvement. The one is by new inventions, the other by rendering workmen more expert.

The encouragement of invention has long been a favourite object with the public, and every one also is sensible of the importance of having operative tradesmen properly instructed; yet hardly any thing has ever been done towards attaining this last end, however desirable. Indeed, if we except the case of ploughmen, scarcely one class of the members who are employed in providing us with the necessaries of life, has ever had the stimulus of a prize for superior excellence held out to them, though there is not one among them to whom it might not be applied with perfect ease and with incalculable effect.

However varied and complicated a man's employment may be, a very few simple operations will suffice to show his merits. Thus, from the formation of a mortise and tenon, from the construction of a pannelled door, from the fitting of a drawer, the jointing of a leaf of a table, and one or two other such works, a perfect idea may be formed of the qualifications of all the various denominations of squaremen, in every stage of their progress. Each of these works might accordingly be assigned to a separate class of competitors, as the test of their advancement; and in every other trade a similar selection might be made, adapted to the various degrees of proficiency of its members. By these means some object of ambition might be placed within the reach of the youngest apprentice, while the most expert

workman would not find himself without rivals; and to preserve his pre-eminence, would be compelled to continue his exertions.

The details of such a system must of course be left to practical men; but there are one or two general principles which appear to apply universally, and which, indeed, seem quite necessary to the success of any attempt of the kind. 1. No class should be so large as not to afford a fair chance of success to every individual comprised in it; but that superior merit may obtain a corresponding distinction, the successful competitors in the first class should be brought again in competition with one another for an additional prize, just as in a coursing match. 2. That every one may know with whom he is to contend, the name of each competitor should be entered in a public list, a considerable time before the day of trial. 3. The work by which the merit of each class is to be ascertained, should, as far as possible, be executed in the same place, and at the same time, both to insure that no one shall produce any thing but what he has himself executed, and also for the purpose of comparing the different modes of doing the same thing, practised by different workmen. 4. That competitors may have complete assurance of perfect impartiality, they ought, in every case, to have the choice of their own judges. 5. It may be mentioned, in the last place, that books appear by far the best prizes that can be given, both on account of the valuable information which may be thus communicated, and also because a suitable inscription can be put upon them at no expense.

These principles of competition have already been tried with great success by the Glenkens Society, an institution which was formed about two years ago in a retired district of the Stewartry of Kirkcudbright, for a similar purpose with that now under consideration; and there can be no doubt that competitions thus conducted, would be still more beneficial under the influence of the condensed population of a large town.

It has long been a general complaint among masters, that they find it next to impossible to fix the attention of their apprentices: that even their journeymen can hardly be prevailed upon to take an interest in their work beyond what is necessary to provide themselves with bread, and that the idle hours of both are grossly misspent. Indeed, so long as their utmost dexterity and skill can do so little towards raising them into public notice, we can hardly wonder that their work should hang so heavily on their hands; and that their relaxations should be of a kind of which we cannot approve. But were a ladder afforded to a working tradesman by which he might raise himself step by step from his obscurity to such a station as his talents and acquirements enable him to fill with credit to himself and benefit to the public; and were it made plain to him that whatever step he may at present occupy on this ladder, no great exertion would be required to gain one step higher, there cannot be a doubt that the emulation which has by similar means been excited among ploughmen, would be excited in him also, and in a much greater degree. The ordinary occupations of a workshop would become interesting to him as preparations to his public exhibitions; and the time during which he is not thus engaged,

would be employed by him in gaining some acquaintance with such branches of science as may be connected with his trade. This unquestionably would be the effect of these competitions on all the ablest men among these classes; and as it is from them that the whole take their tone, their example would be speedily followed. The community at large would become industrious and economical, and men who now sink through all the gradations of idleness and want, till they end in crime, would become active and useful members of society.

This would necessarily produce no inconsiderable diminution in the number of paupers, while it would at the same time tend to lessen the expense of all the necessaries of life. Every hand being improved to the utmost, and employed in the best possible way, would be rendered proportionably more productive, and as the most important inventions have almost all been made by working tradesmen, a very rapid addition to them might be confidently anticipated, from the prodigious force of the talent thus brought into operation, which is at present altogether dormant.

To these considerations it must be added, that the proposed competitions would do much towards establishing the connexion between the higher and lower classes, which, of late years, has been almost entirely done away, very much to the injury of both. Indeed, however anxious a rich man may now be to make himself useful to his poorer neighbours, he has it not in his power. He comes seldom into contact with any of them, but such as have already reduced themselves to beggary by idleness and dissipation, and, finding that any thing he may give them is worse than thrown away, he either abstains from charity altogether, or commits his contributions to some of the benevolent societies with which his country abounds. By them he is sure that his donations will be judiciously administered; but, when thus made they will do nothing towards securing him a place in the affections of the persons relieved, who, being unacquainted with their benefactor, cannot, of course, make to him any return of gratitude. But were the stamp of merit fixed on the really deserving by these competitions, a class of persons would be offered to the notice of the higher ranks, who would be every way deserving of their countenance. To them it would be given willingly and liberally. It would not fail to produce corresponding feelings of attachment and respect, and the various ranks would thus gradually become bound together by all those sympathies which enhance the joys, and sooth the sorrows of life. [*Ibid.*

¶ *Mr. Hancock's Steam Omnibus.*

Sir,—More than six years have elapsed since I began my experiments on steam locomotion; and I have followed it with an ardour that did not admit of any diversion from the grand object which I kept steadily in view. During the past week I have exhibited daily on the Paddington road a steam omnibus, the result of my experience;

and having hitherto carefully steered clear both of extravagant anticipations and exaggerated statements, I should be very sorry if any such should now find their way into the public prints. In order to prevent this, as far as I am able, I beg to hand you, for insertion in your wide-spreading miscellany, the following results of the first six days:—

April 22.—Started from cottage lane, City road, to Paddington, and from Paddington to London Wall, and back to Cottage lane—9½ to 10 miles—1 hour, 8 minutes. Delays 18 minutes; travelling 50 minutes.

April 23.—From Cottage lane to Paddington and back to Cottage lane—8½ miles—1 hour, 11 minutes. Delays 9 minutes; travelling 62 minutes.

April 24.—Same ground—1 hour 4 minutes. Delays 11½ minutes; travelling 53 minutes.

April 25.—Same ground and back as far as St. James' Chapel; piston broke.

April 26.—Same ground and back to Cottage lane—49 minutes. Delays 5 minutes; travelling 44 minutes.

April 27.—Same ground—50 minutes. Delays 5½ minutes; travelling 44½ minutes.

Average quantity of coke, one sack to each trip.

It is not intended to run this carriage more than about a week longer; partly because it was only intended as a demonstration of its efficiency, and partly because my own occupation will not admit of my personal attention to the steering, which I have hitherto performed myself, having no other person at present to whose guidance I could with propriety entrust it. During the time that it will require to build two more carriages for the Paddington Company, I shall have one or two others of my own running, which will afford me an opportunity for training steersmen, &c., for this road, which, of all others I am acquainted with, requires the greatest steadiness and attention.

I am, sir, your obedient servant,

Stratford, May 1, 1833. W. Hancock.

[*Mech. Mag.*

¶ *The Enterprise Steam Omnibus.*

Sir,—I hand you for insertion a continuation of the performance of the "Enterprise steam omnibus:—

	Miles.	Total Time.	Delays.	Travelling.
April 29, from City road to Paddington and back, .	8½	51′	5½′	45½′
30, . .	,,	51	6½	44½
May 1, from City road to Paddington, thence round Finsbury square, and back to City road, .	10	78	15	63
2, . . .	,,	67	9	58

	Miles.	Total Time.	Delays.	Travelling.
May 3, ...	10	79′	18′	61′
4, ...	,,	70	$12\frac{1}{2}$	$57\frac{1}{2}$
6, ...	,,	65	8	57
7, from City road to Paddington, round Finsbury square, and thence to Paddington, where the welding of the centre of the crank shaft gave way; put on a collar and returned to city road.				
8, from City road round Finsbury square, and thence to Paddington; put in new fire bars.	At the former average speed.			
9, from Paddington to the bottom of City road, returned to Paddington, and back to City road.				

This journey concludes, for the present, the first series of operations of the "Enterprise," as stated in my last.

I expect to have one of my own carriages running daily in the course of the ensuing month, and a second in the month following, and trust that during the summer not less than four will be running in the neighbourhood of town, and that their performance will ensure to this mode of transit the patronage of the public.

I am, Sir, your obedient servant,

Stratford, May 13, 1833. W. Hancock.

[*Ibid.*

¶ *Liverpool and Manchester rail-way.*

We have more than once had occasion to notice the unfair attempts made by the partizans of canals in opposition to rail-ways, to represent the Liverpool and Manchester rail-way as an entire failure, as far as regards the conveyance of goods, and are now glad to be able to lay before our readers unanswerable evidence of the falsity of these representations. From the last half yearly Report of the Directors it appears that the success of the undertaking depends not on any single branch of business, but that each of the great divisions of the concern, the transit of passengers, of merchandise and coal, have severally, and largely, contributed to the revenues of the Company. The total quantity of merchandise conveyed along the line, in the six months ending the 31st December last, was 86,842 tons; the total quantity of coal 39,940 tons; and number of passengers 182,823. There were 3,363 trips of thirty miles performed with passengers. 1,679 with goods; and 211 with coals. The increase in merchandise during the last six months, as compared with the preceding half year,

was 7,821 tons, in coals 10,484 tons. One of the most prominent articles under the head of merchandise, is timber. In the five months preceding 31st December, no less than 2,297 tons were conveyed to Manchester; and excellent accommodations for the unloading of timber having been provided at the Manchester end, the Directors anticipate a very considerable increase of business in this department.

[*Ibid.*

New Vacuum Sugar.

The grains of this beautiful sugar are true and well formed crystals. They do not melt so readily as common sugar,—a circumstance that induces some inaccurate observers to imagine that this sugar is not so sweet as common muscovada. The taste is just that of fine *candy.* The advantage is that this sugar is far less hygrometric than common raw sugar, and suffers less from a moist atmosphere. The apparatus used in its preparation is a modification of the late Mr. Howard's apparatus for boiling sugar in *vacuo:* with strainers of copper plates pierced with minute holes, or several folds of wire gauze for clarifying the sirop. The process is, immediately on crushing the canes, to heat, lime, and scum, the juice, which, while warm, is forced through the strainer, from which it runs into the boiler. These are provided with air-tight covers, the tops of which are connected by tubes with a large air pump, wrought by a steam engine. The steam, as generated, is thus drawn off, and the boiling is thus carried on at a temperature far below the boiling point of sugar. When sufficiently concentrated, the sirop is crystallized, and when consolidated it is carried to the curing house, the temperature of which is kept up by steam pipes running into it. This process saves much sugar, for the heating being low, little or no molasses are formed, and a large quantity of sugar is obtained, which, in the old process, is converted into molasses. This apparatus was adopted by sugar-growers in Demerara, on the suggestion of a distinguished philosopher in Liverpool. The experiment has succeeded admirably; and the sugar bears a premium in the Liverpool market, especially when required for coffee.

[*New Edinburgh Philos. Jour.*

On the Prevention of Dry Rot.

At a meeting of the Royal Institution, after adverting to the extensive decay of wood in ships, houses, and other structures of that material, involving a loss of such magnitude as to have excited almost universal search after a remedy, Mr. Faraday said he should pass by all propositions for its prevention, except that one absolutely introduced by Mr. Ryan, and to which Mr. Faraday had paid particular attention. The process is now largely in use. The wood, prior to its application, is immersed in a solution of corrosive sublimate; in the course of a week, a load of it is found to have absorbed five gallons of solution, and at the end of that time it is removed, and shortly afterwards becomes fit for building. The preservative powers of

corrosive sublimate in furs, stuffed birds, anatomical specimens, &c., are well known; and those which it exerts over wood seem to be not less decisive, and far more useful. Pieces of timber thus prepared were put into a fungus pit at Woolwich for three years, and at the end of that time taken out perfectly sound. Canvass and calico, treated in a similar manner, were also found to be preserved from mildew and decay.

Mr. Faraday's suspicions appear to have been excited not so much as regarded the preservative power of the process, as by the healthiness of the wood, canvass, &c. impregnated by it; and he required that such prepared materials should be thoroughly washed, and then submitted to a test for proving the power of resisting decay. He found, after calico and canvass had been washed in water until all the solution which that fluid could remove, had disappeared, (mercury was still present,) such *prepared* materials were preserved in a damp cellar, while the *unprepared* went rapidly to decay. Having ascertained this combined state of the mercurial preparation, Mr. Faraday expressed his opinion that the organic substances could be well preserved by it without deriving any unwholesome quality to deteriorate their ordinary application. [*Ibid.*

¶ *Whitelaw's Improvement in Barker's Mill.*

Sir,—In reading over Mr. Scholefield's remarks on my improved form of Barker's mill, I perceive that his wrong ideas on the subject have arisen from his misunderstanding me. He thinks the mill is so constructed that the action of the water to turn it will be only on the concave surface of the outer curve of the arms. If I had intended *any* of the force of the water to be communicated to the mill in this way, I would not have taken *b f equal* to the distance that the extremity of the arms would pass over in the time that a particle of water moves from the centre of the mill to the extremity of the arms; I would have taken it *greater*. He is mistaken, too, when he thinks that there will be no force of reaction as the water leaves the mill, when the arms and jet holes have equal areas; there would be none if the water left the arms in a radial direction; but if he had examined the cut in p. 76 of the Journal, (the same as shown in p. 353 of your Magazine, last volume,) he would have seen that the ends of the arms are so shaped as to make the water flow from them in the line of a tangent to the circle described by the jet holes.

It was as early as the beginning of the year 1824, that I thought of giving the arms of Barker's mill the curve form. The Editor of the Glasgow Mechanics' Magazine takes notice of a communication of his correspondent, M. N., on the subject, in the number of that work for the 29th January, 1825; but a proper account of it was not published till I did it in the Journal of the Franklin Institute. My reasons for drawing the mill with a tube shaft, instead of having a packed joint close by the arms, are, 1st, that it makes a simpler and better understood drawing; 2nd, in some cases the tube shaft is the

best way for leading the water into the arms; and, 3d, any person who knows any thing at all about the mill, knows also about the packed joint, and could use it or not as he thought proper. I hope that the above, together with the fact that my account of the mill was published in the Journal of the Franklin Institute before his account was given in your Magazine, will satisfy your correspondent, φ. μ.

I take this opportunity for correcting three errors of the press in my former communication on this subject. In the 17th line from the top of the 74th page of the Journal of the Franklin Institute, (vol. x.) for "*upper stone*" read "*aperture*;" and in the 39th line of the same page, "*a* to *h*," should read "*a* to 2;" then, two lines below this, for "4" read "3." These errors are continued in your Magazine; the first, in the 5th line from the bottom of the 354th page; the second in the 16th line from the top of the same page, and the third two lines below it.

As the Editor of the Journal of the Franklin Institute occasionally makes extracts from the Mechanic's Magazine, if he thinks proper he can copy my remarks on the observations made by Mr. Scholefield on my form of Barker's mill, into his Journal.

I am, Sir,
Your obedient servant,
JAMES WHITELAW.

Glasgow, June 15, 1833.

[*Mech. Mag.*

¶ POPULAR SCIENCE.

No. IV.

Selections from Letters on Natural Magic.
By Sir DAVID BREWSTER.

An individual raised on the fingers of four other persons.

One of the most remarkable and inexplicable experiments relative to the strength of the human frame which you have yourself seen and admired, is that in which a heavy man is raised with the greatest facility, when he is lifted up the instant that his own lungs and those of the persons who raise him are inflated with air. This experiment was, I believe, first shown in England a few years ago, by Major H. who saw it performed in a large party at Venice under the direction of an officer of the American navy. As Major H. performed it more than once in my presence, I shall describe as nearly as possible the method which he prescribed. The heaviest person in the party lies down upon two chairs, his legs being supported by one and his back by the other. Four persons, one at each leg, and one at each shoulder, then try to raise him, and they find his dead weight to be very great, from the difficulty they experience in supporting him. When he is replaced in the chair, each of the four persons takes hold of the body as before, and the person to be lifted gives two signals by clapping his hands. At the first signal he himself and the four lifters

begin to draw a long and full breath, and when the inhalation is completed, or the lungs filled, the second signal is given for raising the person from the chair. To his own surprise and that of his bearers, he rises with the greatest facility, as if he were no heavier than a feather. On several occasions I have observed that when one of the bearers performs his part ill, by making the inhalation out of time, the part of the body which he tries to raise is left, as it were, behind. As you have repeatedly seen this experiment, and have performed the part both of the load and of the bearer, you can testify how remarkable the effects appear to all parties, and how complete is the conviction, either that the load has been lightened, or the bearer strengthened by the prescribed process.

At Venice the experiment was performed in a much more imposing manner. The heaviest man in the party was raised and sustained upon the points of the forefingers of six persons. Major H. declared that the experiment would not succeed if the person lifted were placed upon a board, and the strength of the individuals applied to the board. He conceived it necessary that the bearers should communicate directly with the body to be raised. I have not had an opportunity of making any experiments relative to these curious facts; but whether the general effect is an illusion, or the result of known or of new principles, the subject merits a careful investigation.

Exposure of the body to high degrees of heat.

The kindred art of walking on burning coals, or red hot iron, remounts to the same antiquity. The priestesses of Diana at Castabala in Cappadocia were accustomed, according to Strabo, to walk over burning coals; and at the annual festival which was held in the temple of Apollo on Mount Soracte in Etruria, the Hirpi marched over burning coals, and on this account they were exempted from military service, and received other privileges from the Roman senate. This power of resisting fire was ascribed even by Varro to the use of some liniment with which they anointed the soles of their feet.

Of the same character was the art of holding red hot iron in the hands or between the teeth, and of plunging the hands into boiling water or melted lead. About the close of the seventeenth century, an Englishman of the name of Richardson rendered himself famous by chewing burning coals, pouring melted lead upon his tongue, and swallowing melted glass. That these effects are produced partly by deception, and partly by a previous preparation of the parts subjected to the heat, can scarcely admit of a doubt. The fusible metal composed of mercury, tin, and bismuth, which melts at a low temperature, might easily have been substituted in place of lead; and fluids of easy ebullition may have been used in place of boiling water.

But even when the fluid requires a high temperature to boil, it may have other properties which enable us to plunge our hands into it with impunity. This is the case with boiling tar which boils at a

temperature of 220 degrees, even higher than that of water. Mr. Davenport informs us, that he saw one of the workmen in the king's dock yard at Chatham, immerse his naked hand in tar of that temperature. He drew up his coat sleeves, dipped in his hand and wrist, bringing out fluid tar, and pouring it off from his hand as from a ladle. The tar remained in complete contact with his skin, and he wiped it off with tow. Convinced that there was no deception in this experiment, Mr. Davenport immersed the entire length of his fore-finger in the boiling caldron, and moved it about a short time before the heat became inconvenient. Mr. Davenport ascribes this singular effect to the slowness with which the tar communicates its heat, which he conceives to arise from the abundant volatile vapour which is evolved, "carrying off rapidly the caloric in a latent state, and intervening between the tar and the skin, so as to prevent the more rapid communication of heat." He conceives also that when the hand is withdrawn, and the hot tar adhering to it, the rapidity with which this vapour is evolved from the surface exposed to the air, cools it immediately. The workmen informed Mr. Davenport that if a person put his hand into the caldron with his glove on, he would be dreadfully burnt; but this extraordinary result was not put to the test of observation.

But though the conjurers with fire may have availed themselves of these singular properties of individual bodies, yet the general secret of their art consisted in rendering the skin of the exposed parts callous and insensible to heat,—an effect which may be produced by continually compressing or singeing them till the skin acquires a horny consistence. A proof of this is mentioned by Beckmann, who assures us that in September, 1765, when he visited the copper works at Awestad, one of the workmen, bribed by a little money to drink, took some of the melted copper in his hand, and after showing it to the company, threw it against a wall. He then squeezed the fingers of his horny hand close to each other, held it a few minutes under his arm-pit to make it perspire, as he said, and taking it out again, drew it over a ladle filled with melted copper, some of which he skimmed off, and moved his hand backwards and forwards very quickly by way of ostentation. During this performance, M. Beckmann noticed a smell like that of singed horn or leather, though the hand of the workman was not burned. This callosity of the skin may be effected by frequently moistening it with dilute sulphuric acid. Some allege that the juices of certain plants produce the same effect, while others recommend the frequent rubbing of the skin with oil. The receipt given by Albertus Magnus for this purpose was of a different nature. It consisted of a non-conducting calcareous paste, which was made to adhere to the skin by the sap of the marsh mallow, the slimy seeds of the flea-bane, and the white of an egg.

Spontaneous Combustion.

So recently as 1744 a similar example of spontaneous combustion occurred in our own country at Ipswich. A fisherman's wife of the name of Grace Pett, of the parish of St. Clements, had been in the habit for several years of going down stairs every night after she was half undressed to smoke a pipe. She did this on the evening of April 9th, 1744. Her daughter, who lay in the same bed with her, had fallen asleep, and did not miss her mother till she awaked early in the morning. Upon dressing herself, and going down stairs, she found her mother's body, laying on the right side, with her head against the grate, and extended over the hearth with her legs on the deal floor, and appearing like a block of wood burning with a glowing fire without flame. Upon quenching the fire with two bowls of water, the neighbours, whom the cries of the daughter had brought in, were almost stifled with the smell. The trunk of the unfortunate woman was almost burned to ashes, and appeared like a heap of charcoal covered with white ashes. The head, arms, legs, and thighs, were also much burned. There was no fire whatever in the grate, and the candle was burned out in the socket of the candlestick, which stood by her. The clothes of a child on one side of her, and a paper screen on the other, were untouched; and the deal floor was neither singed nor discoloured. It was said that the woman had drunk plentifully of gin overnight in welcoming a daughter who had recently returned from Gibraltar.

Fluids in the Cavities of Minerals.

In examining with the microscope the structure of mineral bodies, I discovered in the interior of many of the gems, thousands of cavities of various forms and sizes. Some had the shape of hollow and regularly formed crystals; others possessed the most irregular outline, and consisted of many cavities and branches united without order, but all communicating with each other. These cavities sometimes occurred singly, but most frequently in groups, forming strata of cavities at one time perfectly flat and at another time curved. Several such strata were often found in the same specimens, sometimes parallel to each other, at other times inclined, and forming all varieties of angles with the faces of the original crystal.

These cavities, which occurred in sapphire, chrysoberyl, topaz, beryl, quartz, amethyst, peridot, and other substances, were sometimes sufficiently large to be distinctly seen by the naked eye, but most frequently they were so small as to require a high magnifying power to be well seen, and often they were so exceedingly minute that the highest magnifying powers were unable to exhibit their outline.

The greater number of these cavities, whether large or small, contain two new fluids different from any hitherto known, and possessing remarkable physical properties. These two fluids are in general

perfectly transparent and colourless, and they exist in the same cavity in actual contact, without mixing together in the slightest degree. One of them expands *thirty* times more than water, and at a temperature of about eighty degrees of Fahrenheit, it expands so as to fill up the vacuity in the cavity. When heat such as that of the hand is applied to the specimen, the vacuity gradually contracts in size, and wholly vanishes at a temperature of about eighty degrees.

When the cavities are large compared with the quantity of expansible fluid, the heat converts the fluid into vapour, an effect which is shown by the circular cavity becoming larger and larger till it fills the whole space.

When any of these cavities, whether they are filled with fluid or with vapour, are allowed to cool, the vacuity reappears at a certain temperature. In the fluid cavities the fluid contracts, and the small vacuity appears, which grows larger and larger till it resumes its original size. When the cavities are large, several small vacuities make their appearance and gradually unite into one, though they sometimes remain separate. In deep cavities, a very remarkable phenomenon accompanies the reappearance of the vacuity. At the instant that the fluid has acquired the temperature at which it quits the sides of the cavity, an effervescence or rapid ebullition takes place, and the transparent cavity is for a moment opaque, with an infinite number of minute vacuities, which instantly unite into one, that goes on enlarging as the temperature diminishes.

Having fallen upon a method of opening the cavities, and looking at the fluids, I was able to examine their properties with more attention. When the expansible fluid first rises from the cavity upon the surface of the topaz, it neither remains still like the fixed oils, nor disappears like evaporated fluids. Under the influence, no doubt, of heat and moisture, it is in a state of constant motion, now spreading itself on a thin plate over a large surface, and now contracting itself into a deeper and much less extended drop. These contractions and extensions are marked by very beautiful optical phenomena. When the fluid has stretched itself out into a thin plate, it ceases to reflect light, like the thinnest part of the soap bubble, and when it is again accumulated into a thicker drop, it is covered with the coloured rings of thin plates.

After performing these motions, which sometimes last for ten minutes, the fluid suddenly disappears, and leaves behind it a sort of granular residue. When examining this with a single microscope, it again started into a fluid state, and extended and contracted itself as above. This was owing to the humidity of the hand which held the microscope, and I have been able to restore by moisture the fluidity of these grains twenty days after they were formed from the fluid. This portion was shown to the Rev. Dr. Fleming, who remarked, that had he observed it accidentally, he would have ascribed its apparent vitality to the movements of some of the animals of the genus Planaria.

After the cavity has remained open for a day or two, the dense fluid comes out and quickly hardens into a transparent and yellowish

resinous looking substance, which absorbs moisture, though with less avidity than the other. It is not volatilized by heat, and is insoluble in water and alcohol. It readily dissolves, however, with effervescence in the sulphuric, nitric, and muriatic acids. The residue of the expansible fluid is volatilized by heat, and is dissolved, but without effervescence in the above mentioned acids. The refractive power of the dense fluid is about 1.295, and of the expansible one 1.131.

The particles of the dense fluid have a very powerful attraction for each other, and for the mineral which contains them, while those of the expansible fluid have a very slight attraction for one another, and also for the substance of the mineral. Hence the two fluids never mix, the dense fluid being attracted to the angles of angular cavities, or filling the narrow necks by which two cavities communicate. The expansible fluid, on the other hand, fills the wide parts of the cavities, and in deep and round cavities it lies above the dense fluid.

When the dense fluid occupies the necks which join two cavities, it performs the singular function of a fluid valve, opening and shutting itself according to the expansions or contractions of the other fluid. The *fluid valves* thus exhibited in action may suggest some useful hints to the mechanic and the philosopher, while they afford ground of curious speculation in reference to the functions of animal and vegetable bodies. In the larger organizations of ordinary animals, where gravity must in general overpower, or at least modify, the influence of capillary attraction, such a mechanism is neither necessary nor appropriate; but, in the lesser functions of the same animals, and in almost all the microscopic structures of the lower world, where the force of gravity is entirely subjected to the more powerful energy of capillary forces, it is extremely probable that the mechanism of immiscible fluids, and fluid valves, is generally adopted.

In several cavities in minerals I have found crystallized and other bodies; sometimes transparent crystals, sometimes black spicular crystals, and sometimes black spheres, all of which are movable within the cavity. In some cavities the two new fluids occur in an indurated state, and others I have found to be lined with a powdery matter. This last class of cavities occurred in topaz, and they were distinguished from all others by the extraordinary beauty and symetry of their form. One of these cavities represented a finely ornamented sceptre, and, what is still more singular, the different parts of which it is composed lay in different planes.

When the gem which contains the highly expansive fluid is strong, and the cavity not near the surface, heat may be applied to it without danger, but in the course of my experiments on this subject, the mineral has often burst with a tremendous explosion, and in one case wounded me on the brow. An accident of the same kind occurred to a gentleman, who put a crystal into his mouth for the purpose of expanding the fluid. The specimen burst with great force, and cut his mouth, and the fluid which was discharged from the cavity had a very disagreeable taste.

In the gems which are peculiarly appropriated for female ornaments,

cavities containing the expansible fluid frequently occur, and if these cavities should happen to be very near the surface or the edge of the stone, the fever heat of the body might be sufficient to burst them with an alarming and even dangerous explosion. I have never heard of any such accident having occurred; but if it has, or if it ever shall occur, and if its naturally marvellous character shall be heightened by any calamitous results, the phenomena described in the preceding pages will strip it of its wonder.

Meteorological Observations for July, 1833.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Dew point	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches				Inches.	
☺	1	63°	87°	29.95	29.95	67°	W. SW.	Moderate.		Light clouds—clouds.
	2	68	88	.80	.80	67	SW.	Brisk.		Fog—clear.
	3	66	62	.70	.70	67	W.	Moderate.		Rain—cloudy.
	4	58	74	.80	.90	54	W.	Brisk.		Clear day.
	5	56	74	30.10	30.10	50	W.	Moderate.		Clear day.
	6	53	79	.10	.10	53	W.	do.	0.06	Clear—shower in night.
	7	69	84	29.94	29.90	70	W.	Brisk.		Cloudy—flying clouds.
	8	98	85	.80	.80	71	W.	do.		Clear—flying clouds.
☽	9	72	82	.70	.70	65	W.	do.	0.20	Rain—clear.
	10	58	79	.94	.94	51	W.	Moderate.		Clear—Aurora Borealis.
	11	60	82	.84	.70	55	W.	Brisk.	0.45	Clear—thunder shower.
	12	64	82	.70	.80	55	W.	Moderate.		Clear day.
	13	70	89	.90	.90	70	W.	do.		Cloudy—clear.
	14	75	90	.90	.80	76	W.	Brisk.	1.83	Clear—flying clouds—thunder
	15	66	81	.33	.83	56	W.	Moderate.		Clear day. [shower.
	16	58	68	.85	.85	48	W.	Brisk.		Clear day.
⊗	17	64	74	.80	.60	60	SE.	Moderate.		Cloudy—flying clouds.
	18	59	77	.95	30.00	52	W.	do.		Clear day.
	19	58	76	30.10	.10	51	W.	do.	0.09	Clear—cl'dy—shower in ni't.
	20	64	82	.00	.00	66	W.	do.		Cloudy—clear.
	21	66	81	.05	.05	72	W.	do.		Cloudy—flying clouds.
	22	69	92	.00	.00	76	SE. W.	do.		Fog—clear.
	23	72	86	.00	.00	60	SE. W.	do.		Clear day.
	24	68	90	.00	29.90	76	SW.	do.	0.09	Cloudy: clear: thunder show-
	25	72	74	29.90	30.00	67	NE.	do.		Cloudy day. [er: high wind.
	26	63	80	30.10	.10	59	NE.	do.		Clear day.
	27	62	85	.10	20.90	70	SW.	do.		Clear day.
	28	70	82	29.80	.85	67	NW.	Breeze.		Clear day.
	29	59	79	30.00	30.00	61	NW. S.	Moderate.		Clear day.
	30	72	80	29.70	29.65	72	S.	do.	0.25	Cloudy—shower.
☾	31	58	75	.70	80	50	W.	do.		Clear day.
	Mean	64.51	80.61	29.89	29.89	60.4			2.97	

	Thermometer.	Barometer.
Maximum height during the month,	92. on 22nd.	30.10 on 5th, 6th, 19th, 26th, 27th.
Minimum do. . .	53. on 6th.	29.33 on 15th.
Mean do. . .	72.56 .	29.89

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MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

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AMERICAN AND OTHER PATENTED INVENTIONS.

OCTOBER, 1833.

TO THE COMMITTEE ON PUBLICATIONS.

An investigation of a formula for calculating the transfer of water from one level to another, by the lockage of boats in canals.

By S. C. Walker.

The natural tendency of fluids towards a level, or state of equilibrium, renders it easy to transfer water from the summit level to the lowest level, by the simple opening of gates. When there is a scarcity of water in the summit level, the deficiency may be supplied by stationary steam engines, and the loss from evaporation, leakage, and other causes provided for. It is an inquiry of importance whether there may not sometimes be in the circumstances of the country through which canals pass, natural means of which advantage can be taken to effect a transference of water from the lowest to the summit level. Should such means present themselves, the expediency of using them to effect this transfer, in any proposed canal, would be determined by an estimate of the expense of locks adapted to the purpose, of the time lost by lockage, and the value of the water thus raised to the summit level, or omitted to be drained away.

With these statistics, the present inquiry has no concern, its object being to ascertain whether such a transference is possible in any instance, and if so, in what instances, and under what circumstances it is possible.

Make l' = the length, in feet, in the clear of a lock.
l'' = the average length, in feet, of a boat.
w' = the width, in feet, in the clear of a lock.

$w'' =$ the average width, in feet, of a boat.

$d' =$ the difference, in feet, of the levels above and below the lock.

$d'' =$ the average depth, in feet, of the water displaced by the boat going from the upper to the lower level.

$d''' =$ the same for the boat returning from the lower to the upper level.

$m =$ the factor by which a cubic foot of water must be multiplied to obtain its weight in parts of a ton avoirdupois.

Then $m\,l'\,w'\,d' =$ the tons of water required to raise the water in the lock from lower to upper level.

$m\,l''\,w''\,d'' =$ the tonnage of the boat descending.

$m\,l''\,w''\,d''' =$,, ,, ascending.

In canals where there are no lateral reservoirs,

$m\,l'\,w'\,d' =$ the constant loss of water transferred from upper to lower level by locking a boat in either direction.

$m\,l''\,w''\,d'' =$ the tons of water transferred upwards by the descending boat by virtue of the fixed gates used as fulcra. These tons are first transferred above the upper gates by admission of the boat into the lock, by virtue of the fixedness of the lower gates: the contrary supposition involving the absurdity of maintaining that the lock receives the addition of $m\,l''\,w''\,d''$ tons without raising the level. The same amount $m\,l''\,w''\,d''$ tons is again transferred from the lower level into the lock, by the removal of the boat below the lower gates, by virtue of the fixedness of the upper gates. The contrary supposition involves the absurdity of maintaining that one horse can by his single strength elevate a number of tons, $m\,l''\,w''\,d''$, through a height d'' without any mechanical advantage.

The same reasoning may be applied to the ascending boat.

$m\,l''\,w''\,d''' =$ the tons transferred from the lock to the lower level by admission of the ascending boat, by virtue of the fixedness of the upper gates, and again transferred from the upper level to the lock by removal of the boat upwards, by virtue of the fixedness of the lower gates. The contrary hypothesis involving similar absurdities.

It will now be easy to deduce a formula for expressing the transfer of water by the two operations of locking a boat downwards and upwards, whatever be the load of the boat in either direction.

Make T = the number of tons thus transferred from one level to the other by this double operation, the positive value being upwards from lower to upper level, the negative value downwards from upper to lower level.

$$T = m\,(l''\,w''\,d'' - l''\,w''\,d''' - 2\,l'\,w'\,d') \cdots\cdots (1)$$

$$= m\,\{l''\,w''\,(d'' - d''') - 2\,l'\,w'\,d'\} \cdots\cdots\cdots\cdots (2)$$

Make $p =$ the factor by which l'' must be multiplied to equal l'.

$g =$ similar factor for w'' to produce w'.

Then
$$p\,l'' = l'$$
$$g w'' = w'$$

Substituting the values of l' and w' in (2)

$$T = m\{l''\,w''\,(d'' - d''') - 2\,p\,q\,l''\,w''\,d'\}$$
$$= m\,l''\,w''\,(d'' - d''' - 2\,p\,q\,d') \cdots\cdots\cdots\cdots (3)$$

In this formula the conditions to be fulfilled in order that T may be positive, in other words that there may be a net transfer from the lower to the upper level, is that $d'' > (d''' + 2\,p\,q\,d')$. This is manifestly possible; for by constructing the boat to fit closely to the sides and end of the lock, $2\,p\,q$ may be diminished at pleasure, and d' may be taken of any amount, however small. In practice the natural limit to the smallness of d' depends upon the cost of locks and the value of time lost in lockage through a multiplicity of locks; d''' may be the depth of water displaced by an empty boat, d'' by a loaded boat; in such an instance the above conditions may be verified, even without lateral reservoirs for diminishing the loss from difference of level.

The same formula will readily enable us to calculate the transfer of water in those canals whose locks are provided with lateral reservoirs.

Make $a =$ the factor by which the loss $2\,m\,p\,q\,l''\,w''\,d'$ must be multiplied in order to be equal to the diminished loss caused by the use of lateral reservoirs. Then we have

$$T = m\,l''\,w''\,(d'' - d''' - 2\,a\,p\,q\,d') \cdots\cdots (4)$$

Where the condition of a net gain being made by transference from the lower to the upper level is $d'' > (d''' + 2\,a\,p\,q\,d'.)$

I am indebted to Mr. Millington of this city for information that a reward of £500 was offered for the invention of a method by which, without any foreign moving force, the loss from lockage in the Regent's canal, London, might be reduced to 0. Such a reduction appears to be impossible in that canal, from the circumstance that the annual average is $d'' < d'''$, and therefore, for a stronger reason, is $d'' < (d''' + 2\,a\,p\,q\,d')$.

The value of the factor a in this canal is $\frac{1}{20}$, and the loss from difference of level is diminished by lateral reservoirs to $\frac{1}{20}$ of that which would otherwise be made.

The formula (4) has been prepared for one lock with two gates, it is obvious that the same holds true of each of the locks of a canal. It is general, and embraces all the varieties of locks.

Make $D'' =$ the annual average of depth of water displaced by descending boat.

$D''' =$ that by ascending boat.

$n =$ the number of passages of boats from summit level to lowest level and back, then if all the locks are constructed alike,

Make $A =$ the annual amount transferred from one level to the other, positive value upwards.

$$A = m\,n\,l''\,w''\,(D'' - D''' - 2\,a\,p\,q\,d') \cdots\cdots (5)$$

Where the condition of positive gain is $D'' > (D''' + 2\,a\,p\,q\,d')$.

The same formula will enable us to determine in any proposed canal where D'' is much greater than D''', the smallest number of locks with which a given difference of level $\triangle$ may be overcome consistent

with the above condition, viz. that there shall be an annual gain of water transferred from the lowest to the summit level. In this case

$$n\,d' = \triangle \text{ and } n = \frac{\triangle}{d'} \quad \text{Putting } \frac{\triangle}{d'} \text{ for } n \text{ in (5)}$$

$$A = m\frac{\triangle}{d'}\,l''\,w''\,(D'' - D''' - 2\,a\,p\,q\,d') \cdots\cdots (6)$$

From which n disappears and the condition remains as before

$$D'' > (D''' + 2\,a\,p\,q\,d')$$

Transferring D''' to the other side of the inequality, we have

$$(D'' - D''') > 2\,a\,p\,q\,d' \cdots\cdots (7)$$

Dividing this inequality (7)

$$\frac{D'' - D'''}{2\,a\,p\,q} > d' \cdots\cdots (8)$$

For d' put its value $\frac{\triangle}{n}$

$$\frac{D'' - D'''}{2\,a\,p\,q} > \frac{\triangle}{n} \cdots\cdots (9)$$

From the inequality (9) it appears that the smallest integer value of n admissible under the above condition, is such that the quotient arising from the division of $\triangle$ by it, must be less than the numerical value of the expression $\frac{D'' - D'''}{2\,a\,p\,q}$, when $a = \frac{1}{20}$ as in the Regent's canal, the inequality (9) becomes

$$\frac{10\,(D'' - D''')}{p\,q} > \frac{\triangle}{n} \cdots\cdots (10)$$

In the Schuylkill canal we have $D'' > D'''$, because the amount of descending tonnage of anthracite coal, far exceeds the amount of ascending tonnage. It is therefore manifest that the condition (8), or (9), as well as (10), is possible in this canal. It is not my object to inquire at present concerning the amount of ascending and descending tonnage, a reference to the statistics of this canal would furnish any one with the means of assigning the values to the first member of these inequalities, and thence to deduce the number of locks required, and the descent of each, subject to the condition that the annual result of lockage on that canal should be a transference of a certain number of tons of water from the tide water of the Schuylkill river to the summit level of the Schuylkill canal.

The above demonstration rests upon the principle of equivalence of action and reaction. In the motion of cars or carriages on roads or rail-roads, this reaction is not perceptible; yet the theory of gravitation shows that it exists; let m = the mass transferred on a road; let n = the number of miles on the arc of the earth's circumference through which the car moves; then $m\,n$ = the momentum in this arc of rotation round the earth's axis thus effected by using successive points of this circumference as fixed fulcra: then it is evident that there exists an equivalent motion in the contrary direction of the same arc. This cannot take place among the particles at the earth's surface, accordingly, a motion of the earth's mass takes place, which

resolved in the same arc, is equivalent and contrary. In the motion of boats, this reaction takes place immediately and perceptibly by virtue of the same law. If a number of tons of coal be transported on the banks of the Schuylkill canal, an equivalent contrary motion of the earth's mass takes place unperceived; but if the same number of tons of coal be transported in the canal through the same space, then an equal number of tons of water are transferred by reaction through the same space in a contrary direction.

My only aim in the above communication has been to demonstrate a principle first applied to canals by Dr. Dewees of Pottsville, Pa., Journal Franklin Institute, vol. xi. p. 111.

Philadelphia, August 21st, 1833.

TO THE COMMITTEE ON PUBLICATIONS.

Description of a process and an apparatus for Blasting Rocks, by means of Galvanic Ignition.

Communicated by ROBERT HARE, M. D., Professor of Chemistry in the University of Pennsylvania.

I have observed various accounts in the newspapers of workmen killed or dreadfully lacerated by the blasting of rocks.

This, and many like occurrences will, I presume, create sufficient interest in the following communication, to justify its appearance in the Journal of the Franklin Institute.

I have ascertained that by a new application of galvanism, rocks may be riven with less danger than that which attends the firing of a pistol. I was induced to attempt this improvement in consequence of an application by a patentee (Mr. Moses Shaw,) for assistance in perfecting his patented mode of blasting rocks, by an electrical discharge from a Leyden jar.

In a letter dated June 1st, 1831, he says, "I have been engaged in blasting rocks by means of a fulminating powder, introduced into several cavities, and ignited in all of them simultaneously, by a spark from an electrical machine, by which means masses of a much larger size, and of a much more suitable shape, for any object in view, may be procured, than by the old plan. I have, however, to lament my inability to succeed in this method of blasting, during a great part of the year, when, in consequence of the unfavourable state of the weather, the ignition cannot be effected by electricity in any mode which I have devised, or which has been suggested by others, although I have consulted all the best informed professors to whom I have had access."

It occurred to me, as soon as this statement was made by Mr. Shaw, that the ignition of gunpowder, for the purposes he had in view, might be effected by a galvanic discharge from a deflagrator, or calorimotor, in a mode which I have long used in my eudiometrical experiments to ignite explosive gaseous mixtures. This process is free from the uncertainty, which is always more or less attendant upon the employment of mechanical electricity, for similar purposes.

The expectation thus arising, has since been fully verified. I have ignited as many as twelve charges of gunpowder at the distance of

one hundred and thirty feet, from the galvanic machine employed This distance is much greater than is necessary to the safety of the operator, as the deflagrator may be shielded so as not to be injured by the explosion, and by means of levers and pulleys it may be made to act at any distance which may be preferred. There is no limit to the number of charges which may be thus ignited, excepting those assigned, by economy, to the size of the apparatus employed.

These remarks have reference to the principal and highly important object of Mr. Shaw's project, which is to ignite at once a great number of charges, in as many perforations so drilled in a rock, as to co-operate simultaneously in the same plane. By these means it is conceived that the stone may be separated into large prismatic, or tabular masses, instead of being reduced to irregular fragments of an inferior size. The object to which I propose now to call attention more particularly, is a modification of the common process of blasting by one charge, which renders that process perfectly safe.

This part of the subject I shall introduce by premising, that almost all the accidents which have taken place in blasting rocks, have occurred in one of the three following modes:—

1st. The explosion has taken place prematurely, before the operator has had time to retire.

2nd. A premature explosion has ensued from a spark produced by the collision arising from ramming into the perforation, containing the powder, the brickdust, or sand, or other matter, employed to close it.

3d. The fire not reaching the charge after the expiration of a period unusually long, and the operator returning to ascertain the cause of the supposed failure, an explosion ensues when he is so near as to suffer by it, as in the instance near Norristown, published some years ago.

The means of communicating ignition, to which I have resorted, are as follows:—

Three iron wires, of which one is of the smallest size used for wire gauze, the others of the size (No. 24,) used by bottlers, are firmly twisted together. This is best accomplished by attaching them to the centre of the mandril of a lathe, which is made to revolve while the other ends of the wires are held by a vice, so as to keep them in a proper state of tension. After being thus twisted, a small portion is untwisted, so as to get at and divide the larger wires by means of a pair of nippers. In this way the smaller wire is rendered the sole mean of metallic connexion between the larger ones. These are tied in a saw kerf, so made in a small piece of dogwood as to secure them from working, which, if permitted, would cause the smaller wire to break apart. At one end, the twist formed of the wires is soldered to the bottom of a tin tube of a size to fill the perforation in the rock to such a height as may be deemed proper. This tube being supplied with gunpowder, the orifice is closed with a cork, perforated so that the twisted wire may pass out through it without touching the tube at any point above that where the finer portion alone intervenes. To the outside of the tube, a copper wire, about No. 16, is soldered, long enough to extend to a stout copper wire proceeding from one of the

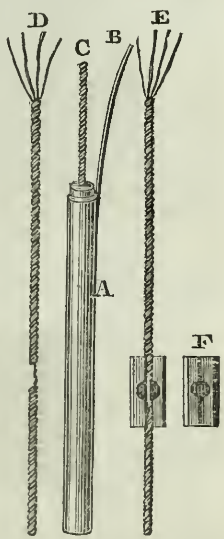
poles of a galvanic deflagrator or calorimotor. The wire passing through the cork from the inside of the tube, is in like manner made to communicate with the other pole. The connexions between the wires and the poles, should be made by means of soft solder, previously to which we must imagine that the tube has been introduced into a perforation made for its reception in a rock to be blasted. The tin tube may be secured within the rock by the usual method of ramming in brickdust or sand, by means of a plug, having holes for the protection of the wires of communication already described.*

The apparatus being thus prepared, by a galvanic discharge, produced by the movement of a lever through the quarter part of a circle, the finer wire is ignited, in the place where it intervenes solely in the circuit, so as to set fire to the surrounding gunpowder.

As the enclosure of the gunpowder in the tube, must render it impossible that it should be affected by a spark elicited by ramming, as no means of ignition can have access to the charge besides the galvanic discharge; and as this can only occur by design, without an intention to commit murder or suicide, or by unpardonable neglect, it is inconceivable that an explosion can take place in this method of blasting, when any person is so situated as to suffer by it.

It must be obvious that in all cases of blasting under water, the plan of a tin tube, and ignition by a galvanic circuit, must be very eligible.

At A is represented a cylinder or tube of tinned iron, replete with gunpowder. At C, the twisted wires are represented as they protrude from the cylinder through a cork, by which the latter is closed at the upper end. The other ends of the wires are soldered to the metallic disk which forms the bottom of the cylinder. D represents the twisted wires as they appear when all the larger ones are cut, the smaller wire still uniting them. F represents the piece of dogwood, duly prepared; and E the wires as when supported by the wood. The reader has only to imagine the hole in the wood, to be supplied with the fulminating composition, and covered by a fillet of paper or cloth, glued or pasted around the wood, in order to complete his conception of the wires as finally accoutred and situated within the cylinder A.



Besides affording support to the larger wires, and thus protecting the smaller wire uniting them from fracture, the piece of dogwood which has been described, by means of the small hole represented in it, serves to hold, and to preserve in contact with the lit-

* It has occurred to me that plaster of Paris might be used advantageously, as it would require no ramming, and might set with sufficient firmness.

tle wire, some fulminating powder. This not only facilitates the incipient ignition of the contents of the cylinder, but must make it extend more rapidly throughout the mass, and must, of course, cause it to be more powerful. Metallic arsenic, and chlorate of potash finely powdered and mingled, make an excellent explosive powder for this purpose; being more ready to explode from heat, and less so from other causes, than fulminating silver or mercury. Sulphur may be used in lieu of arsenic. Yet the use of these is not necessary, as the gunpowder will take fire directly from the wire, at least as effectually as in the usual mode.

Description of a Galvanic Machine, for producing ignition in Rock Blasting.

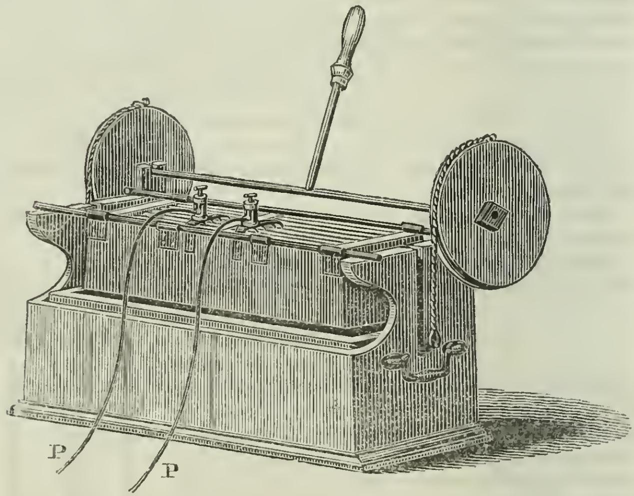
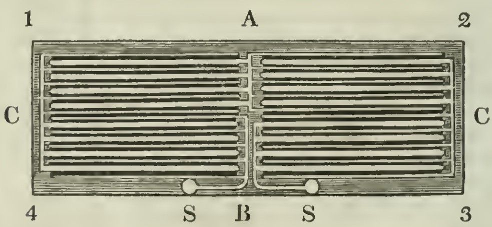


Diagram illustrating the arrangement of the plates.



This machine consists of sixteen plates of zinc, and twenty plates of copper, each twelve inches by seven, arranged in four galvanic

pairs. The plates are supported within a box with a central partition of wood, A B, dividing it into two compartments. Each of these may be considered as separated into two subdivisions by four plates of copper between the letters C C. Of course the box may be considered as comprising four distinct spaces, No. 1, No. 2, No. 3, and No. 4. The circuit is established in the following manner. Between the zinc plates of compartment No. 1 and the copper plates of compartment No. 2, a metallic communication is produced, by soldering their neighbouring corners to a common mass of solder with which a groove in the wooden partition between them is filled. With similar masses of solder, two grooves severally made in the upper edges of each end of the box are supplied. To one of them, the corners of all the copper plates of space No. 1, and the zinc of space No. 4, are soldered. To the other, the zinc plates of space No. 2, and the copper plates of space No. 3, are soldered in like manner. Lastly, the zinc plates of No. 3 are connected by solder in a groove, and the copper plates of No. 4 are in like manner connected by solder in another groove. Upon the ends, S S, of the solder just mentioned, the gallows screws are severally soldered, and to these the rods, P P, called poles, are fastened.

Rationale.

The zinc and copper surfaces of No. 1 and No. 2, communicating, have their naturally opposite electric powers exalted, and induce in the plates with which they are alternated, a like exaltation, still higher. By the communication of the latter with the surfaces in No. 3, and No. 4, a similar effect is induced, and again by induction the electric powers of the plate alternating with those last mentioned are augmented. Hence a discharge between the latter will have a quadruple intensity, and hence the poles, or rods, communicating with the gallows screws, soldered as above described to the zinc and copper plates last mentioned, will make a discharge through any conductor whenever the apparatus is put into operation by raising the acid, so as to enable it to surround and act upon the galvanic surfaces.

When, agreeably to the project of Mr. Shaw, several masses of gunpowder are to be simultaneously ignited, in as many different holes in the same rock, I purpose to introduce into each hole, a cylinder prepared as here represented; to secure them by ramming into the hole, sand, brickdust, or other suitable matter, through which the wires are allowed to pass so as to project on the outside. All the wires corresponding with that represented at B in the engraving are then to be soldered to a rod proceeding from one pole to a calorimotor; and all those corresponding with C to another rod proceeding from the other pole. In case the calorimotor cannot be placed at a sufficient distance to secure it from injury, it may be shielded by a strong cover. Under this, the *operator* might be protected; but if it be not convenient to have the shield large enough for his protection, a cord may be resorted to, which being attached to the lever of the machine, and made to pass through one or more pulleys, will enable

him to cause the acid to act upon the plates, at any distance which can be desirable.

It can scarcely be necessary to point out that the method of communicating ignition described here for the purpose of rock blasting, may be applied as the means of exploding a mine. As, for instance, the mines associated with the fortifications erecting near Newport, as a part of the means of annoyance, might have a communication through copper wires with a galvanic apparatus in those situations to which the beseiged might be expected to retire, putting it thus completely in the power of the commanding officer, to select that time for the explosion when its effects would be most serviceable.

Apparatus for transferring a liquid from a carboy, or cask, to bottles; especially useful in the case of sulphuric acid, the decanting of which is always more or less dangerous to the manipulator, especially as detached globules may reach the eyes.

By ROBERT HARE, M. D. Professor of Chemistry in the University of Pennsylvania.

By means of a treadle T, the rod R, and platform P, the bottle is, by the foot, pressed against a brass disk D, coated with gum elastic. In the centre of this disk are two holes, one of which receives a leaden tube communicating with an exhausting syringe S, while into the other hole another tube is soldered, which extends to the bottom of an adjoining carboy of sulphuric acid. By means of

the syringe, the bottle being exhausted, the contents of the carboy are forced into it by atmospheric pressure.

The gum elastic being stretched over the disk, is secured by a clasp which is fastened round the periphery by a screw.

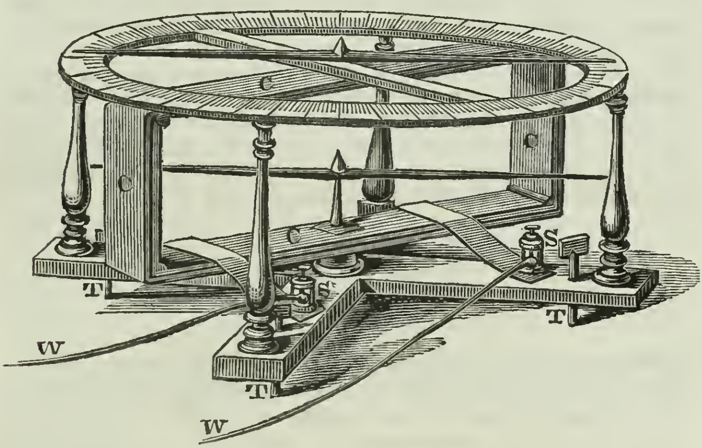
This apparatus may be employed to raise liquors into a bar room, from casks in a cellar, with this advantage over the pump now used for that purpose; that the liquor does not pass through a pump. It has only to come into contact with a pipe of from one-fourth to three-eighths of an inch in bore.

The attachment to the cask is easily made by a gallows screw soldered to the nozzle of a cock, or simply to a ferule which may be driven into a cork hole, punching the cork before it.

The foaming of fermented liquors would be promoted by the exhaustion, lessening, for a time, the atmospheric pressure on the carbonic acid.

Improved Galvanometer or Multipher, of an unusually large size.

By ROBERT HARE, M. D. Professor of Chemistry in the University of Pennsylvania.



This engraving represents a large multipher, or galvanometer, the needles of which are each about eighteen inches in length. The instrument is furnished above with a circle graduated into 360 degrees. Agreeably to the usual construction, the needle being within, the coil is subjected both above and below to the concurring influence of a current passed through the coil. In this predicament is the lower needle in the adjoining figure. When a needle is situated outside of the coil like the upper one in this figure, the influence of the lower portion of the coil, so far as it operates, must counteract that of the

upper one. Yet when the lower portion of the metallic coil is at a distance from the upper portion of about one-third of the length of the needle, and this is situated very near to the upper portion as here represented, the influence of the latter may so far predominate as to render the indications very nice; while they are as much more easily seen and estimated by means of the graduated circle, when, as in the situation of the upper needle, nothing intervenes between it and the eye.

In another instrument of the same dimensions I have used only a semicircle for the graduations, which, excepting the appearance, answers as well.

In lieu of wire, a coil of tin foil of about an inch in breadth and eighty feet in length, separated by thin paper, may be used, but a copper wire of No. 16 and of about 180 feet in length, coated with shell lac varnish, will be more efficacious.

The coil of tin foil or varnished copper wire, is wound about the parallelogram C C C C. The ends of the coil are severally soldered, or screwed, under the basis of the gallows screws S S.

When both needles are placed upon the pivot at the same time by the repulsion of their similar poles, they will diverge from the meridian unless they be in a reversed situation, in which case they will both appear as in the engraving, the north pole of one pointing north, the north pole of the other needle south. When, under these circumstances, a discharge is made through the surrounding coils, the consequent movements are very striking.

The clean surfaces of disks of zinc, and copper, each an inch in diameter, separated by paper moistened with pure water, are sufficient to move the needles sensibly. The wires W W are used for the purpose. They are attached to the instrument by gallows screws S S.

The level of the machine is preserved by the aid of four screws, of which only three can be seen in the drawing at T T T.

The Girard College.

ADDRESS

By Nicholas Biddle, Esq.

Chairman of the Trustees of the Girard College for Orphans; pronounced by request of the Building committee, on the occasion of laying the corner-stone of the edifice, July 4th, 1833.

(Concluded from p. 154.)

They would much err, who, comparing this institution with any ordinary standard, regard it as an Alms House, or a Poor House, in which a certain number of pauper boys housed together, to be kept from harm, are to receive some hasty rudiments of instruction, and then to be thrust out on the world to make way for a similar swarm of unfortunate children. By no means. The comprehensive benevolence of Girard looks to higher and better things. It is not a poor school, nor a charity school, nor a free school, in their ordinary acceptation. It is, as he denominates it, a "college." The peremp-

tory prohibition that "no distinctive dress should ever be worn," reveals his purpose that these youths shall not be designated as objects of remark or contempt by their contemporaries, that they shall be distinguished only by their conduct, and shall not wear the livery even of charity. The instruction, too, required, is of the highest character, embracing almost every thing worthy of being studied in the circle of human knowledge. "They shall be instructed," says he, "in the various branches of a sound education, comprehending reading, writing, grammar, arithmetic, geography, navigation, surveying, practical mathematics, astronomy, natural, chemical, and experimental philosophy, the French and Spanish languages. (I do not forbid, but I do not recommend the Greek and Latin languages;) and such other learning and science as the capacities of the several scholars may merit or warrant."

This excludes nothing—nay, it embraces every thing necessary to form a well educated man. How far this institution is to be carried—whether when the degrees of talent and disposition come to be analysed, some are to be instructed up to the point of their appropriate capacity, while the more intelligent and more diligent are to be carried into the higher regions of science, are questions of future administrations to be decided by experience. But it is manifest that all the means of education, thorough, perfect education, are to be provided, that every facility for the acquisition of knowledge should be at hand; nor is there any reason why the Girard College—liberally endowed beyond all example—should not be superior to any existing establishment, in the talents of its professors, or the abundance of its means of instruction, and, with the blessing of God, so it shall be. There shall be collected within these walls all that the knowledge and research of men have accumulated to enlighten and improve the minds of Youth. It will be the civil West Point of this country, where all the sciences which minister to men's happiness, and all the arts of peace may be thoroughly and practically taught. Its success will naturally render it the model for other institutions—thus, not merely accomplishing the direct benefit of those to whom its instruction extends, but irradiating by its example the whole circumference of human knowledge.

To this intellectual cultivation, will be added that without which all instruction is valueless, and all learning the mere ability for evil—that moral discipline which makes men virtuous and happy at their own firesides. "My desire is," says he, "that all the instructors and teachers in the college shall take pains to instil into the minds of the scholars, the pure principles of morality, so that on their entrance into active life, they may, from inclination and habit, evince benevolence towards their fellow creatures, and a love of truth, sobriety, and industry." When this harmony between the heart and the understanding ceases, mere knowledge is a curse, and men become intellectual statues, with the perfect forms of manly exterior, but cold, and selfish, and worthless, to the community which endures them. Our youth, too, will not fail to be deeply imbued with that enthusiastic devotion to republican government, and that knowledge

of his public rights and duties which should form the basis of the American character. It is thus that the founder strictly enjoins "that by every proper means, a pure attachment to our republican institutions, and to the sacred rights of conscience as guaranteed by our happy constitution, shall be formed and fostered in the minds of the scholars."

Nor need there be any dread that such an education will disqualify them for their pursuits in after life. In this country all pursuits are open to all men, nor need the humblest citizen despair of the highest honours of the republic. They err who suppose that because men are instructed, they may desert the ordinary walks of employment. There never can be such an over education of the mass of the people. Men labour not for a want of knowledge, but for want of bread. The cultivation of the mind, like the cultivation of the soil, only renders it more productive, and knowledge becomes the best auxiliary to industry by rendering the labourer more intelligent, and more ambitious to excel. The youths thus instructed will go forth into the various pursuits in life, many of which are in their nature mechanical; but they will begin with the disposition and the power not merely to excel in them, but to rise beyond them, and they will emerge from their workshops, as their countrymen Franklin, and Rittenhouse, and Godfrey, and Fulton, did before them, reaching all the distinctions of the state which may be honourably won by talents and character.

That the scene of so many blessings may be appropriated to them, it is intended to make this structure worthy of its great object, worthy of the name of its founder, and of the city which he was so anxious to embellish. Among the sciences most needed in this country, where individual wealth is hastening to indulge its taste, and where every state, and city, and county, requires extensive public buildings, is architecture. Indispensable in the rudest forms of life, it becomes the highest ornament of the most enlightened. In every stage of its progress, the style of its public works displays the character of the nation which rears them. Disproportioned and grotesque among a coarse and unlettered people: in nations more advanced, often over ornamented with the gaudy profusion and the caprices of tasteless wealth; it is only when sustained by the public spirit of a community at once enlightened and generous, that architecture attains its highest glory, a refined simplicity. Of that perfection, it is proposed that this structure shall present a model, the equal at least of similar works in any other country, and not unworthy of the best days of antiquity, a structure which will at once gratify the honourable pride of every citizen of the United States, and form the best study for all the branches of industry connected with architecture.

The enjoyment of so many advantages devolves on us, fellow citizens, the duty of great care and vigilance to preserve them.

After bestowing upon our city this rich inheritance, Girard adds this emphatic declaration. "In relation to the organization of the college, and its appendages, I leave necessarily many details to the Mayor, Aldermen, and citizens of Philadelphia, and I do so with the

more confidence, as from the nature of my bequests, and the benefit to result from them, I trust that my fellow citizens of Philadelphia, will observe and evince special care and anxiety in selecting members for their City Councils and other agents."

That the generous confidence with which he has thus committed to us the execution of his great designs, should never be betrayed, we owe equally to the name of the founder, and to the interests of our posterity, as the whole value of this institution will depend entirely on the administration of it. For myself and my colleagues to whom the high honour has been assigned of sharing in that administration, I can only say, fellow citizens, that we have assumed the trust with the deepest sense of its responsibility, and a determination to execute it in the spirit of enlightened benevolence which animated the founder, and we shall in our turn retire from it, with the hope that our fair city may always find successors, who, to equal zeal, add greater ability to serve it.

Under such auspices, we confidently trust that all the expectations of the founder will be realized. With this delightful anticipation, we now invoke the blessing of God on this great undertaking.

In the name of *Stephen Girard, of the city of Philadelphia, and commonwealth of Pennsylvania, Merchant and Mariner*, we lay the foundation of this *Girard College for Orphans*. We dedicate it to the cause of CHARITY, which not only feeds and clothes the destitute, but wisely confers the greatest blessings on the greatest sufferers;

To the cause of *education*, which gives to human life its chief value;

To the cause of *morals*, without which knowledge were worse than unavailing; and, finally,

To the cause of our *country*, whose service is the noblest object to which knowledge and morals can be devoted.

Long may this structure stand, in its majestic simplicity, the pride and admiration of our latest posterity; long may it continue to yield its annual harvest of educated and moral citizens to adorn and to defend our country. Long may each successive age enjoy its still increasing benefits, when time shall have filled its halls with the memory of the mighty dead who have been reared within them, and shed over its outward beauty, the mellowing hues of a thousand years of renown.

The College is located on a tract of land containing forty-five acres, formerly known by the name of Peel Hall, situated on the Ridge Road, one and a fourth miles from the city. This estate was purchased from Mr. William Parker, by Mr. Girard, a short time before his death, for the purposes of the College.

The building is peripterial, being 160 feet front, by 217 feet on the flank, including the porticoes.

The columns are six feet in diameter at the base, and fifty-four feet six inches high, including capitals and bases.

The order is Grecian Corinthian, from the monument of Lysicrates, or Lantern of Demosthenes, at Athens.

The superstructure reposes on a casement, in the form of a truncated pyramid, composed of twelve steps surrounding the whole building. The passage between the columns and the wall of the cell is fifteen feet.

All the columns, entablature, and pediment, are to be composed of white, and the cell of light blue marble. The floor, and stairways, are also to be composed of marble.

The vestibules are each twenty-six by forty-eight feet; they are ornamented with sixteen rich Ionic columns, antæ, and entablature, supporting a ceiling embellished with lacunari.

Each story contains four rooms fifty feet square in the clear. The two rooms across the south end of the first story, are divided from each other by marble columns, and entablature of the Corinthian order, so that they may be used as one room, for the purpose of exhibitions, &c.

The whole building is to be heated by means of furnaces placed in the cellar.

The college is located parallel with the city streets, fronting the south. The land at the base of the building is twenty-six feet above the reservoir on Fair Mount. The whole height of the edifice is ninety-seven feet, making the elevation of the roof 123 feet above the said reservoir.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN APRIL, 1833.

With Remarks and Exemplifications, by the Editor.

1. For an improvement in the *Paddle Gate*, for canal locks; Earl Trumbull, Little Falls, Herkimer county, New York, April 4.

The contrivance here patented is denominated a radiating paddle gate. It is in form like the valves sometimes used in the ash pits of stoves to regulate the draft. There may be two or more arms turning on a centre, and covering corresponding orifices cut in the lock gate. In order to open or close the paddle, a rod attached to the extremity of one of the arms, extends up to the top of the gate, where it is acted on by a lever. The gate is intended to be of cast iron, and is to increase in thickness as it narrows in approaching the centre. In one used for experiment, the circle of the centre was between four and five inches in diameter; the paddle gate seven and a half feet in length, and the ends of the wings fourteen inches wide.

The claim is to the radiating paddle gate, and its application to canal locks, &c."

2. For a mode of *attaching Soles to Boots and Shoes;* Saml. D. Breed, city of Philadelphia, April 4.

(See specification.)

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3. For an improvement in the *Still;* John Wright and David Polley, city of New York, April 4.

The specification of this patent is not a very excellent production in a literary point of view; a circumstance, however, which might be passed over as one of little importance, were the description clear, and the claim definitive; but the former is obscure, and the latter not to be found. Various tubes and cocks are noticed, and also a "goose" "in the shape of an egg," which is a reservoir intermediate between the still and the worm, or refrigerator. A tube rises from the still head, and passes into the body of the goose, where a partial condensation into low wines is to take place, which low wines are allowed to run back through the "low wine pipe" into the still, the higher spirit passing, from another tube in the body of the "goose," into the worm. The patentees, speaking of the description, and the accompanying cut, &c. "pray [that they] may be considered as documents explanatory of the subject, and worthy of a benign and favourable construction."

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4. For an improvement in the *Plough;* Henry Peachy, city of Washington, District of Columbia; an alien, who has given notice of his intention to become a citizen of the United States. April 5.

The object of this, so called, improvement, is to lessen the friction of the earth against the mouldboard in turning the furrow slice over. With this view the middle part of the mouldboard is made completely round, and allowed to revolve upon gudgeons; the upper gudgeon working in the frame work of the beam, and the lower in the sole of the plough. This revolving part is sketched in the margin.

Such an *improvement*, we are convinced, will be worse than useless, as but a very small portion of the revolving part can be exposed to the action of the sward as it is turned up, without bringing the slice too abruptly against it; but apart from this and other objections, the dust will soon insinuate itself between the revolving and the stationary parts, and put a final stop to the revolution. "The discovery and invented improvement claimed, is the principle and application of a cylinder, or cylinder roller, or rollers, wheel or wheels, in the construction and making the *revolving mouldboard plough.*"

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5. For a *Corn Sheller;* Samuel Donnell, Greensborough, Guilford county, North Carolina, April 5.

This corn sheller acts upon the same principle with that first patented, thirty years ago, which consisted of a cylinder set with spikes, made to revolve in a concave borne up by springs, between which cylinder and concave, the corn was shelled. In the present instance,

instead of spikes, rods or ribs of iron are to be nailed along the cylinder, at suitable distances apart. The lower part of the concave, borne up by springs, is formed of slats placed at such a distance apart as shall retain the cobs, but allow the corn to pass through. The patentee avers "that of the above described machine all and every part is new except the cylinder, and on it there is an improvement by having the iron rods nailed straight with it."

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6. For an improved mode of *Constructing Vessels;* Commodore James Barron, U. S. Navy, city of Philadelphia, April 5.

The object of this improvement is to construct vessels which cannot be sunk, even if filled with water. Their buoyancy is to be the result of the quantity of material of a less specific gravity than water which enters into their composition, and which is to be such that it will compensate for the absolute weight of the metallic, or other ponderous articles on board.

In building, the first log laid may be the keel, and upon this a tier of logs is to be laid crosswise, and above these a tier lengthwise; proceeding thus with layers of logs which alternately cross each other, until a solid bottom of sufficient thickness has been formed. The logs are to be secured together by strong treenails, and it is recommended to give to each of them a complete coating of turpentine and tallow before laying them.

When this solid part has been completed, and the desired model formed, a rebate is to be made all around it, by cutting two or more inches inwards, and two or more feet downwards. The timbers, or ribs, to form the upper works are then to be let in flush with this rebated part, by cutting into the solid timber. A thickness will thus be left for the lower edge of the lower plank.

The wood to be used in constructing the solid parts of such vessels, is white pine, hemlock, poplar, or others, which have a specific gravity of about four-tenths that of water; the result of which will be that the solid part of the hull, if placed alone in the water, would float with six-tenths of its substance out of that fluid.

The advantages possessed by such vessels, as stated by the patentee, are, their adaptation to the purposes of war, as they cannot be sunk by gunshots. It is also remarked that they will possess many advantages for sea packets, bomb ketches, steam batteries, and gun boats, and likewise for steam vessels on the western waters.

The claim is to "the arrangement and construction of the several parts of the vessel, with solid logs, pinned or bolted together as before described; so as to make it incapable of immersion, and sufficiently strong to resist shocks; whether applied as a vessel of war, a merchant vessel, a steam vessel, or a life boat: but I do not claim the shape of the vessel, nor any of the parts, or their arrangement, now in use. I also claim constructing the sides of vessels with logs, in cases where it may be desired."

We heard a gentleman of the navy object to this mode of construction for vessels of war, that hot shot would lodge in, instead of passing through, the solid timbers, as they do in ordinary vessels, and that,

consequently, the danger of burning them would be greatly increased; this objection, however, we do not think a valid one, as there can be no combustion without a draft of air, which would be prevented by the solidity of the bottom. For steam-boats on the western waters we do not think the plan would answer, as these boats are intended principally for the conveyance of freight, and require all possible room for its stowage.

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7. For a *Canal Boat;* Ezra Reed, Pottstown, Montgomery county, Pennsylvania, April 6.

This canal boat is to be built in parts, or sections, each having its four sides, and bottom. Of these sections there may be six, or more; the two forming the stem and stern may differ in shape from the others, which may be nearly, or quite, alike.

The separate parts are to be united by two pieces of plank on each side, extending from stem to stern, fastened by spikes, or bolts, to the bow and stern sections; the intermediate ones to be kept in their places by chains.

The advantages contemplated are, saving of cost in construction; greater strength and durability; less specific gravity than other boats, and consequently a greater capacity, or burthen. The claim is to "the division of canal boats into parts, or sections, and uniting them in the manner, and for the purposes described."

If any of the contemplated advantages are realized, it certainly will not be the result of the principles assumed. *Less specific gravity!* The writer of the specification certainly does not know what specific gravity means, or he would not have used the term as he has here done. His boat, unloaded, will sink deeper into the water, than an ordinary canal boat of the same dimensions, because its absolute gravity, or weight, will be greater. Suppose it to be in six sections, there are five double ends at the junctions, employing a large quantity of timber, increasing the weight, and diminishing the room; all which is to augment the capacity, and to render the article cheap.

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8. For *Tempering Currier's Knives;* Daniel S. De Lano, Cornwall, Litchfield county, Connecticut, April 6.

This improved mode of tempering, consists in hammer hardening. Hear ye! "What I claim in the above, as my discovery, is the art of producing a proper temper for said knife, by the process of hammering."

There is not a smith in the country who is not acquainted with the process of hammer hardening. Whether it has ever been the practice to depend upon hammer hardening in curriers' knives, we are not informed; but are of opinion, however, that the kind of temper and texture wanted on the edge of such a knife, will best be obtained by hardening and tempering in the usual way, and afterwards condensing the steel by hammering.

9. For *Punching, Cutting, and Slitting Iron, and other Metals;* John V. Buskerk, Norwalk, Huron county, Ohio, April 6.

This machine is nothing more than the lever press, made in the form which the patentee has preferred, or happened to hit upon. He has described all the parts with much care, without designating any one as new, and therefore concludes without making any claim. The machine is highly spoken of by him, as working well and very advantageously, which we do not doubt; but we have seen many such, to which his, we apprehend, would not in any respect be found superior, and from some of which it scarcely differs in form.

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10. For an improvement in *Saw Mills;* Thomas M'Carty, Elmira, Tioga county, New York, April 8.

This patent is taken for what is denominated a "self-setting saw mill," which name it derives from its having slides on the head and tail blocks, which are so operated upon by machinery moved by the action of the mill itself, as to set the log, after it has been properly slabbed, gauging it at each end to any required thickness. The gates for backing the log, and for other purposes, may also be opened and closed at the proper time, by apparatus explained in the specification.

The parts claimed are, the slide on the head block; the mode of moving the slides by levers and weights; the hoisting of the gates by the action of the mill, and also the mode of closing them. The patentee adds, "In fine, I claim the invention of a self-setting saw mill, that is, the setting of the log of its own accord to saw lumber from one-fourth of an inch, to three inches thick."

The latter part of the claim cannot have the effect of preventing others from constructing self-setting saw mills, provided they do not trench upon what may be new in the patent before us, as it cannot forestall future invention. Some of the particular claims of the patentee also, can only be sustained upon the modes which he has adopted, as the same things have been done before; the closing of the gates, and the backing of the log, every one acquainted with such machinery knows to be operations common in saw mills.

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11. For a mode of *Applying Wind to Musical Instruments;* Peter L. Grosh and George Grosh, Lancaster county, Pennsylvania, April 8.

The wind supplying part of this apparatus consists of two pair of bellows, so connected together as that they may act concurrently. They are to be placed one under each arm, and worked in the manner of those used for bagpipes. The patentees allude to a musical instrument of their invention which they denominate an Euphoniad, to which this mode of blowing may be applied, the instrument being held upon the knees; this instrument is not patented, and a description of it was not, therefore, deemed necessary, but the patentees say that "these bellows may be applied to other instruments of music." Not being informed of the construction of the Euphoniad, we are unable to

form any judgment of the advantages which these bellows may possess in playing upon it, but if they are not specially calculated for that instrument, we do not know to what other use they stand any chance of being applied.

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12. For a *Machine for Cutting Sausage Meat;* Lewis Bayha, and Frederick Rapp, Wheeling, Ohio county, Virginia, April 8.

Knives are fixed on the ends of pieces of timber which are raised vertically by means of cams, or lifters, projecting from a revolving cylinder. The meat is placed upon a log or block, which forms the bottom of a trough for containing it. From the revolving shaft of the lifters, and by means of a shaft and bevil wheels, motion is communicated to the block containing the meat, which being thereby moved backward and forward, causes the knives to cut on different parts.

The claim is to "the before described machine; particularly the cylinder with the pegs or projections placed spirally for moving the arms; and the segment wheel, working the racks that move the carriage backward and forward." If a claim cannot be sustained to the general arrangement of the machine, which has but little novelty, it certainly cannot to the "cylinder with the pegs," and "the segment wheel," that has none.

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13. For a *Perpetual Still;* Simon Emery, city of Philadelphia, April 9.

Although the specification of this patent is drawn up with much care, the drawing, or sketch, to which it refers, is in many instances without the letters and numbers employed in the reference; we were able, it is true, to designate the parts intended, but still the omission is not one of trifling consideration.

We cannot, without the drawings, explain the construction and arrangement of the various parts, and shall not therefore make the attempt; especially as there are some things stated which we do not fully comprehend. If the advantages which are said to result from the use of this still, are not very greatly overrated, it must, assuredly, be a very valuable invention; these advantages are the saving of two-thirds of the cost in the first instance, compared with any other still capable of producing the same quantity of equally good spirit in the same time. The economy of fuel, a saving of three parts out of four being made. The saving of time in charging and discharging. The superiority of the products. The producing of more from a fifty gallon still of this construction, than from one of 300 gallons of any other kind.

The claims embrace a number of different items, most of which would require the drawings for their explanation.

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14. For an improved method of *Working the Levers of Fire Engines;* Samuel Huse, Newburyport, Massachusetts, April 9. (See specification.)

15. For a *Thrashing Machine;* John R. Wheeler, Brighton, Monroe county, New York, April 9.

This is called an *intersecting cylinder thrashing machine*, and it has the rare merit of differing entirely in its construction not only from the great mass of those which have been patented, but, we believe, from the whole of them. We are not, however, prepared to speak with equal confidence of its superior utility, as upon this point we entertain strong doubts.

Disks of cast iron are to be made, which may be ten inches in diameter, three-fourths of an inch thick in the middle, tapering regularly on each side from the centre towards the edge, so as to form a feather edge. Each of the sides is to be furnished with angular grooves, or ridges, radiating from the centre to the periphery. A shaft is passed through holes in the centre of these disks, such number of them being put on as to form a cylinder of fifteen, or more, inches in length. Of these cylinders there are to be three, which are to be so mounted on their gudgeons as that the disks shall interlock without touching; the shafts occupying the position of the three angles of an equilateral triangle. The cylinders are to revolve with different velocities, and between them the straw to be thrashed is to be passed. We can very well perceive how the disks of two of the cylinders may interlock, but how those of the third one, behind them, is to do so with the two others we cannot very well understand; it appears, however, that some how or other it is to be done.

The specification is drawn up with some *show* of learning. There is much said about angles and triangles, and "two endless, inclined, circular planes, together with the planes subtending the acute angle which forms the eye on one side extended, gives the action required."

The claim is to "all the above," with the right to alter it in position, materials, &c. &c.

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16. For a *Process for the preservation of Wood;* Charles Morgan, Point Coupee, Louisiana, April 12.

The plan here proposed is to saturate the timber with lime. A cistern of sufficient dimensions, and of any material which will hold water, is to be constructed, and in this the timber is to be placed, taking care that there is a space between each of the pieces, and between them and the cistern. Rain, or river, water is then to be poured in, so as to cover the whole of the timber, to which enough quick lime is to be added to saturate the water. As the water evaporates, and as the lime becomes neutralized by carbonic acid, fresh portions of each are to be added.

The patentee says that from numerous experiments he has ascertained that timber of from one to four inches in thickness, may be saturated with lime in from six to twelve months; and that logs of a foot square may be prepared in from two to three years; and that the durability of the timber will be such as to cause it to last two, three, or more, times as long as it otherwise would.

A wash made of equal parts of lime, wood ashes, salt and molasses,

diffused in water, and applied to shingled roofs, two or three coats being put on, will, it is said, preserve them longer than oil paint.

There is no claim made, the saturation with lime being, it is presumed, considered as altogether new.

Since this patent was issued, the value of the process has been much extolled in the public papers; it is not, however, from these, but from the test of actual experiment, repeatedly tried, and long continued, that we are to learn its real worth. The process has been recommended upon theoretical considerations, it having been asserted that the dry rot is occasioned by an acid contained in the timber, and that this acid is neutralized by the lime; an opinion altogether gratuitous, and not justified by observation. Because the pyroligneous acid is obtained from wood by destructive distillation, it seems to be taken for granted that it existed there ready formed; a conclusion very natural to the uninformed, but very unsatisfactory to the chemist. We wish, more than we hope, that the plan may prove as effectual as the patentee believes it will be; but the known fact that the ends of timbers laid in lime mortar, are more subject to decay than any other part, is at variance, we think, with the doctrines which uphold the anticipations of its advocates.

Saturation with mineral poisons, such as the salts of copper, arsenic, and corrosive sublimate, have all been proposed as preservatives of wood, and the former was some years since made the subject of a patent in England, but we have never heard of it since. The corrosive sublimate has recently been much extolled, (see p. 208.) but, as with the lime, we should rely on time alone to teach us its real value. Oils and resins have also been employed for this purpose, but their use has not become established; indeed, from all we know, we are justified in saying that how we may effectually prevent the dry rot, is still a desideratum.

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17. For an improvement in *Fire Proof Chests and Safes;* James Gayler, city of New York, April 12.

The material employed in the making of these chests and safes is the same as that used in the chests imported from France, and others made in this country. But, in general, the chests are to be made double, in whole or in part, leaving a space filled with air between them; thus, for example, there are to be two doors, or lids, both of which must be opened to take articles from the chest.

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18. For *Backs for Smiths' Forges;* Timothy Bush, jr., Springport, Cayuga county, New York, April 12.

The patentee states that his forge back differs from all others before known, in having the part at the back of the fire made to shift, so that when impaired, it can be replaced without renewing the whole concern: and he concludes with saying that "the principal feature of this improvement consists in the movable or shifting section, through the centre of which the tew iron passes. This I claim, with the privilege of varying the proportion, &c. &c." By turning to the patent

of Frederick Avery, obtained on the 12th day of February last, it will be seen that the main design of the present patent has been anticipated more than once. Our notice of this subject will be found at p. 92 of the present volume.

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19. For an improvement in the *Boiler for Generating Steam;* Matthew T. Wallace, city of New York, April 12.

We have read the specification of this patent until we have become completely bewildered, from the want, as we think, of any thing specific in it, although it is by no means deficient either in length or repetition. There is a very well executed drawing annexed to it, but as there are no references made to it, it helps us out but little. From what we can collect, there are to be seven different fire places, each with its door, grate, and ash pit; and the fire, it seems, is to be surrounded by heaters, containing water, all of which communicate with the boiler above. This boiler, judging from the drawing, has a section something like that of the old Boulton and Watt boiler. That the reader may be able, however, to make some *guess* at the nature and extent of the improvement, which is all that we can do, we will present him with the points claimed.

"I claim the manner of bringing the mouth, or entrance into the heaters, out at the sides of the boiler.

"I claim the application of hinges to grates under fires in water boilers.

"I claim the construction of tubes passing round under the grates.

"I claim the manner of partitioning between the bottom of the boiler and the tubes (or the apron which encloses the grates) and between the grates; and of closing the spaces thus formed in front of the grates, by doors hung by hinges, so as to shut the air off of the grate when necessary.

"I claim the manner of constructing double boilers, so as to allow the person or persons who attend the fires in the heaters, to pass in and out under the top of the boiler where it connects the two, and between the boilers. Two or more boilers may be connected in a similar manner.

"I also, and more particularly, claim the principle and mode of applying heat by burning coal or wood, but more particularly coal, to the boiling of water in boilers constructed for generating steam, in, and by, *several separate small fires*, by means of the particular mode of construction and location of the said heaters. They being so located within the boilers, as to apply the heat as equally as possible to every part of the water within the boiler."

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20. For a *Reacting Water Wheel;* Israel S. Savage, Waterville, Kennebeck county, Maine, April 12.

This improvement consists in so constructing the reaction wheel as that the pressure of the water shall not cause it to bear on the lower gudgeon. "The invention here claimed consists in the rim,

or bottom, upon which the buckets turn for taking off the weight of water, and the mode of adjusting the height of the wheel by the screws and movable gudgeon."

The same object was attained by Calvin Wing, and his mode of doing it is described in the specification of his patent, vol. vii. p. 86, the apparatus used being denominated a lighter. In a patent obtained by John Turner, on the 18th of January, 1831, a similar contrivance is also described, and the same has subsequently been done in other patents.

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21. For *Washing Pulp in the manufacturing of Paper;* Francis Goucher, Chester county, Pennsylvania, April 12.

(See specification.)

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22. For a machine for *Shelling Corn;* Joseph Ross, Boundbrook, Somerset county, New Jersey, April 12.

The corn is to be put into a hopper, against the open end of which there revolves on its axis a sheller, set with spikes, which is in the form of a double cone, truncated, and joined together at its smaller ends. A concave is borne up against each of these cones, by appropriate springs, and between these and the cones, the corn is to be shelled, the grain falling through suitable openings, and the cobs passing off at either end. The chaff is to be blown away by a wind wheel. The claim is to the combination of the several parts of the machine, and particularly to the two frustrums of cones united in the centre; no separate part, with the exception of this, being claimed.

The machine, as represented, appears to us to possess one great defect, and this is in the feeding part; the corn is to be put into a hopper, and we see nothing to prevent its passing in endways instead of longitudinally, the only way in which the shelling can be effected.

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23. For an improvement in the *Revolving Platform used upon Rail-ways;* John Elgar, Civil Engineer, city of Philadelphia, April 12.

(See specification.)

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24. For a *Machine for Breaking Hemp*, Thrashing, Cutting Straw, &c.; Noah G. Hayden, Harrodsburg, Mercer county, Kentucky, April 12.

A horse is to turn a vertical shaft, having a large spur wheel on it, made in the usual way. The cogs of this wheel are to take into a trundle head, fifteen inches in diameter. The shaft of the trundle head is vertical, and from it are to project eight arms, each eight feet long, and made of three by four scantling. A heavy rim is to unite them at about two feet from their ends, and is, we suppose, to operate as a fly wheel. Knives, two feet in length, are to be attached to each of these arms, and are to cut straw; how it is to be fed to them, however, we are not informed. A platform is to be placed above the arms, and two or more break boards, for breaking flax, are also to

make a part of the machinery; these contrivances are, in some undescribed way, to break more hemp, or thrash more grain, than any other machine. There is no claim, and we may add, no explanation.

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25. For an improvement in *Clocks, consisting in Rolling Pinions, and Pinion Wheels;* Joseph Ives, Bristol, Hartford county, Connecticut, April 12.

The patentee does not pretend that the rolling, or revolving, of the wires, which are sometimes substituted for leaves in the pinions of wooden or brass clocks, is new, but he claims to have made an improvement in the mode of fixing them, the value of which, however, we are unable to perceive. The holes in which the pinions turn in the heads at each end, are to be drilled of such size as will allow the wire to revolve freely, without turning it down; or the holes may be drilled smaller, and pivots turned on the end of each wire. The information given amounts to no more than this.

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26. For an improvement in the *Striking part of Clocks;* Joseph Ives, Bristol, Hartford county, Connecticut, April 12.

This improvement consists merely in making the count wheel to revolve once only, instead of twice, in twenty-four hours; to do this, all that is necessary is to repeat the notches for each of the twelve hours; the ordinary number occupying but one-half, instead of the whole circumference of the count wheel.

We apprehend that in Italy, where it is the practice to mark from one to twenty-four upon their dial plates, their count wheels revolve but once in twenty-four hours.

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27. For a *Churn;* James Thorn, Clinton, Dutchess county, New York, April 12.

Two boxes are to be made in the form of square obelisks, with their apices truncated, and the two joined together at their truncations. These, when laid on their sides form the body of the churn, which is to be made to rock on pivots at the point of junction. There is an opening through which the milk is to be put in, and when the churn is rocked, this fluid runs through the tubular communication from one box to the other. An arched air pipe connects the boxes, above, to establish a communication between them, without which the flow of the milk would be obstructed.

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28. For a *Machine for making Spokes for Wheels;* Daniel H. Wiswell, Petersham, Worcester county, Massachusetts, April 12.

The tenons are to be cut by circular saws, and the rounding of the edges of the spokes to be effected by revolving cutters upon cast iron wheels with grooves in them, the cutters and wheels being adapted to the curvature to be given to the edges; the spoke is to be held upon a sliding carriage; this, and the other parts of the apparatus appear

to be judiciously arranged. Spokes made by such a machine will be precisely similar, and in many respects superior to those formed by hand.

"The invention here claimed consists of the whole of the before described machine, when taken together; particularly the wheel of cutters for dressing the edge of the spoke; but no claim is made to circular saws, the gearing, tenoning wheel, or other parts before described, taken separately."

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29. For a *Rotary Steam Generator for Cooking, &c.;* Hardin Branch, city of New York, April 12.

(See specification.)

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30. For a mode of *Taking Measure for Cutting Ladies' and Gentlemen's Clothing;* James Mendenhall, Westchester, Chester county, Pennsylvania, April 16.

There is so little complexity in the mode of taking measure for garments, in the plan here proposed, when compared with the "mathematical protractors," and the numerous other instruments which enrich the files, and embellish the shelves, of the model room in the patent office, as to admit of our looking into the subject, not, it is true, with the eyes of an adept, but with those of an amateur. The following is the proceeding described. A rod, or measuring stick, is to be placed on the floor, and a mark made on it at the top of the hip joint; after this, placing it in front of the candidate, the top of the coat is to be marked on it, and the distance between these two marks taken for the breast. The rod is then to be placed behind, and the length of the back taken to the same mark. A measuring tape is then to be passed round the back part of the neck, round the front part of the arms, and under them, till each end reaches the measure behind the neck. One-fourth of this measure is to be taken for sixteen, and one-half of this sixteen is to be divided into eight parts. The measure round the breast is then to be taken, and the difference between this measure and that round the arms is to be marked to obtain the breast of the coat. The "remainder of the measure is taken from the eight," in what way we are not told, but we suppose the profession will understand it; as to ourselves we find already that we have no claim to connoisseurship in the business. But to proceed,

The distance from the floor, behind and before, shows, we are told, the rounding or hollow of the back. Waistcoats, it is said, can be measured in the same manner as coats; and that, "in measuring for pantaloons, the distance from the arm pits to the hip joints, gives the exact seat;" a proportion of parts which is entirely new to us.

The next point noticed is one of great delicacy, namely, the "taking measure for ladies' garments, or habits." In doing this they are to be "taken round the arms;" and here we beg permission to drop the curtain.

The claim is to "the before described method of taking measure for garments, as distinguished from all the methods now in use."

31. For a *Water Wheel for propelling Steam-boats and other Vessels;* Daniel Holme, Bergen county, New Jersey, April 16.

The buckets of this wheel are not to consist of flat float boards, in the usual way, but are to be made in the form of scoops, having the back and sides enclosed; the form which they thus assume resembling that of the bricklayer's hod. It is proposed to make them of sheet iron.

The claim is to the "making the buckets close at the back and sides;" close buckets, such as are now in use for overshot wheels, are disclaimed, as not invented by the patentee.

For ferry boats, it is proposed to use double scoops, placed back to back, to enable them to pass equally well both ways.

The patentee ought to contrive some mode of obtaining a vacuum in his scoops, or there will be a perpetual conflict between the water and air contained in them, more especially when they are placed back to back.

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32. For *Tide and Current Water Wheels;* Amasa Dingley, of Winslow, and Israel S. Savage, of Waterville, Kennebeck county, Maine, April 16.

The proper frame work for supporting the water wheels, and other parts of the machinery, is to be erected upon a wharf or other suitable place, the mill house being on the shore, and the power obtained being communicated by shafts properly geared. There may be two or more water wheels, each having its proper gearing, so as to obtain their united effect. The water wheels are to be placed upon shafts which may be raised and lowered by means of a pinion and segment wheel, thus regulating their dip into the water.

"The invention claimed is the combination and arrangement of machinery, as described, by which the water wheels are made to work in the water at any required depth; also in conveying the motion to any required distance."

It was necessary for the patentees to limit themselves to the arrangement which they have described and represented, as tide and current wheels are in themselves no novelties, having been very frequently erected. The mode of construction shown in the drawings does not appear to hold out any promise of greater success than has heretofore resulted from similar plans, as it is not more simple, or in any way likely to be more efficient. In most instances tide and current wheels have been failures, as there are but few situations where more convenient and safe modes of obtaining power do not present themselves.

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33. For an improvement in the art of *Grinding Grain and other substances;* Dan Parmele and Isaac C. Shoemaker, Kingston, Luzerne county, Pennsylvania, April 16.

The thing intended to be patented is the mode of constructing a portable grist mill, with stones of two feet in diameter. The particular mode of forming the spindle and gearing would require a draw-

ing for its explanation, but the following outline will suffice for most of our readers. The spindle is to be made double, so that the upper and lower stones, placed upon it, may be caused to revolve in opposite directions. The lower stone is fixed on a hollow shaft, or box, through which the main spindle passes, and in which it turns freely; the upper stone being balanced on the main spindle. Below the stones there are two bevel-geared wheels, one of which is on the hollow shaft of the lower stone, and the other on the main spindle below it. These stand at such a distance from each other as to allow a bevel-geared wheel, upon a horizontal shaft, to mash into each of them, and thus to turn them in opposite directions.

The claim is to "the hollow spindle, being made in two parts for the purpose of preventing heat, and for the great convenience of attaching the other machinery to it. Also the convenience in levelling the lower stone; and by means of the joint in the spindle the surface of the stones working more accurately together without straining the spindle, or any part of the machinery. Also the facility with which four mills of the same dimensions may be run by the same cog wheel which carries one; and also the turning of both stones with a single belt."

As respects some of these claims, the ingenuity of the person who would carry them into operation, would be taxed to devise the mode of so doing, as they are not noticed in the body of the specification.

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34. For an improvement in the *Manufacturing of Shoes, Boots, or other covering for the feet;* Henry Whitman, Edmund Brown, and Stephen Brown, Norfolk, Litchfield county, Connecticut, April 16.

The point claimed as constituting this invention consists in tanning the skins, or hides, with the hair or fur on them, by putting them into a vat containing tannin, extracted from bark, in the usual way. The skins are then to be dressed on the flesh side, and made into shoes, boots, &c.

Although we have seen several processes for dressing, or preparing, skins with the hair on, we do not recollect that either of them consisted in the common process of tanning, yet when this was known it seems impossible that it should not be the first essayed; the patentees are fortunate, therefore, if they have not been anticipated. It seems a little difficult, also, to conceive how a process so simple could demand the joint talents of three persons to invent or discover it.

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35. For machinery for *Mortising Hubs and Felloes* for Wagons; J. Paullin, Dantown, Butler county, Ohio, April 17.

Two instruments are to be used in succession, the first of which is for boring the holes in the hub, in the places where the mortises are to be made. In this machine, the hub is to be fixed vertically upon a table, and held in its place between two uprights having a cross piece at top, forced down by wedges. Pins are to be inserted

into the centre of the hub, upon one of which pins a ratchet wheel is to be placed, having as many teeth on it as there are to be mortises, which by the aid of a pall, serves as a dividing plate. After two holes have been bored, one at each end of the mortise, by means of a bit fixed for the purpose, the hub is to be removed to the mortising machine, where it is fixed with its axis horizontal, and with a ratchet wheel as before. A pitman, or slide, working in a frame above it, is moved up and down by a crank operated on by a wheel and pinion. The lower end of the pitman receives the shank of the mortising chisel, which is to cut each mortise at one stroke. The cutting part is made in the form, and of the size, of the mortise; and is hollow, so that the chips may pass up through it.

The points claimed are the general arrangement of the machinery, and the method of using the ratchet wheel for dividing the hub.

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36. For an improvement in the *Bark Mill;* John Trash, Ahiman Seabury, and William Young, Sangerfield, Oneida county, New York, April 17.

This is to be a cast iron mill, turned by a vertical shaft in the usual way. The nut is a truncated cone, set with teeth, in a manner which is particularly described, and surrounded at its lower part, to the height of about six inches, by a hoop or curb, of cast iron, also set with teeth. From the upper edge of the curb, bars rise, which, passing up nearly to the surface of the revolving nut, unite together near the top of it, leaving between them an opening through which the spindle passes. A hopper surmounts the whole, and is divided into any convenient number of parts, say eight or ten, by vertical partitions, corresponding with, and standing over, the iron bars before described; these regulate the feeding of the bark.

The improvements claimed are the particular manner of setting the teeth; the omission of a rim, jutting, inwardly, over the winged teeth upon the hoop, or curb, and "in its operation, the great and essential improvement is the saving of power."

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37. For a *Lime Kiln;* Thomas H. Powers, Sodus, Wayne county, New York, April 17.

The kiln here described is to be oval at its base, measuring within eight feet by ten. The feeding arch is to be at one end, and over this the wall is to be built vertically, but at all other parts it is to slope out gradually, until, at the height of twelve feet, it is to terminate in a circular opening of twelve feet in diameter. The lime to be burnt is to be piled, or built up, within, so as to leave an opening like an oven, against the feeding arch. The filling is to be managed with much regularity, so as to leave a proper and equable draft, and the result is, according to the patentee, that "a kiln of dimensions sufficiently capacious to contain one thousand bushels of lime, may, in this way, be completely burned in forty-eight hours at farthest, and with ten cords of wood."

The whole kiln must be considered as new, there being no claim made.

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38. For an improvement in the mode of constructing *Vats and Leaches for Tanning;* John W. Moore, Roxbury, Delaware county, New York, April 18.

The vats are to be made in continuous rows in such a way that one planking shall serve as a partition between two contiguous vats. The specification describes the manner of laying the foundation timber, and of forming the floors and vertical partitions, according to this plan. In conclusion, we are informed that "the principle of this invention is designed to be applied to the construction of vats or leaches to be used for other purposes as well as for tanning. The advantages which the inventor thinks he will attain by this invention are—the saving of a considerable space usually occupied by vats in tanning—saving materials and labour in construction—diminishing liability in vats to leak or get out of order; and great facility for making repairs when necessary.

By turning to vol. xi. p. 34, it will be seen that the present patentee has been anticipated in the main object of his invention, by Mr. Wm. Brown of Herkimer county, New York; this gentleman having on the 31st June, 1832, obtained a patent in which he claims "the constructing the sides of the vats of a single board, or plank," "to allow any number of vats to be connected, without the necessity of double partitions."

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39. For an improved *Oven;* Josiah C. Carlisle, Chesterville, Kennebeck county, Maine, April 19.

This oven, we suppose, is to be built of brick, or stone; the lower part of it forms a fireplace something like that of a common stove, with an oven above it. The covering of this fireplace forms the floor of the oven, which is to be built above it in the usual arched manner; the arch, however, is to be thin, and is to have flues leading spirally over it, and terminating in a chimney. There is no claim made, and if we understand the thing, we do not believe that many persons will wish to interfere with the novelties of the invention.

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40. For a *Nursing Cup, or Artificial Nipple;* Sylvester W. Talbot, Dedham, Norfolk county, Massachusetts, April 19.

A vessel with a spout like that of a tea pot, is used to receive the milk intended for food. The end of the spout has a piece fixed on it, in the form of a nipple, and this is to be covered with India rubber, or other soft material. To prevent the too easy flow of the milk, there is to be a valve within the tube, which is to be kept closed by a slight spiral spring, the force of which may be overcome by the efforts of the child.

There is no claim made, but the design, we presume, is to patent the tube furnished with a valve. From our own observation, however, we think that whilst this makes the instrument more complex

than the common sucking bottle, with a silver tube, it is not any better than that. When the tube is made of a suitable size, the proper degree of effort will be required to draw up the milk; and thus all the advantage be obtained which is anticipated from the valve, whilst the vessel can more readily be kept clean.

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41. For apparatus for *Propelling various kinds of machinery;* Thomas L. Codman, Boston, Massachusetts, April 20.

Among the powers employed by the mechanician to give motion to instruments of various kinds, those of air, water, and animal strength, stand conspicuous; but, in general, he uses only but one of these at a time, as it is, in most cases, a thing of no small difficulty to bring them into accordance with each other, in the production of a single effect. It is the province of genius, however, to bring together, in harmonious conjunction, things which common minds would consider as incompatible, and therefore scarcely dream of placing in juxtaposition. Such a rare combination has been effected in the machine, or concatenation of machines, which is the subject of the patent before us. Horses, water, and air, and sometimes manual power also, are each to furnish their quota in making up the sum total of the power which is to be engendered. Some parts of the affair, as described, appear, it is true, rather enigmatical; but at this we ought not to be greatly surprised, as it is no new thing to assume this style in the first introduction of new and important truths. Being fearful of undertaking to epitomize the patentee's description in any considerable degree, we will give his own account of the thing, in nearly his own words.

As many horses, or other animals, as may be desired, are to be placed upon an inclined movable floor, causing a shaft and drum to revolve in the usual way. The shaft is to turn a number of eccentrics, each of which is to operate upon a forcing pump, by which water is to be raised from a cistern, and forced into a cylinder. The air in the cylinder must not be allowed to escape, but is to become condensed by the continued forcing in of the water. The air, so compressed, is to force the water from the cylinder through a tube leading from the bottom of the first into the bottom of a second cylinder; in this it is alternately to compress the bottom and top of a piston, and is to escape therefrom through two pipes, one leading from the top and the other from the bottom of this second cylinder, by both of which it is to be returned into the cistern from which it was first taken, and to be there in readiness to pass again through the same routine.

To the first named cylinder, which is represented in the drawing as standing horizontally, like those of steam engine boilers, a condensing pump is to be attached to force in air, the pressure of which may be made equal to that of several atmospheres. The eccentrics before named, operating as cranks, are to be placed on one common shaft, so as to act alternately, to keep the supply of water, and the pressure equal. Fly wheels are to be employed to regulate the motion. When air alone is to be used, the water pumps are to operate

as condensing air pumps, "the air acting in the cylinder the same as the water."

The machine to be propelled may be attached to the shaft, or piston rod of the second cylinder, drums and bands being used to increase or decrease the velocity, by varying their size. The claim is to the "manner herein described of combining and applying the herein specified powers so as to propel various kinds of machinery."

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42. For an improvement in the mode of *Measuring for Cutting Garments;* Calvin W. M. Bacon, city of New York, April 20.

We have already confessed our ignorance upon the subject in question, and although we have carefully read the specification before us, and examined the drawing accompanying it, we are still without that degree of partial light which belongs even to an entered apprentice.

The instrument described is to be made in the form of the common square used by carpenters; or it may be simply a straight scale, of two feet in length. Along this, three grooves are to be cut from end to end, into which slides are to be fitted, each of which is to be "divided into two parts, marked and graduated as hereinafter described." To us it seems that this *hereinafter* has not yet arrived, as we learn no more than that each of the sections is to be divided into parts of twelve inches, both on their upper and under sides, the slides being made capable of turning either side outwards, and being drawn out at either end. We are further told that at each end of these slides a number is marked "which represents a certain measure, the proportions of which are given by a scale marked thereon." The three slides being divided into two lengths each, and each having two divisions in width, affords twenty-four such scales, which are, it is said, sufficient for all the intended purposes of the instrument.

All that is claimed is "the convenience and facility of applying the graduated sections to the garment which is to be cut." This *convenience* and *facility* may probably be points of much importance, but they are rather intangible parts of an instrument; we suppose, however, that the patentee intended to claim the manner of constructing the graduated sections, so that they may be conveniently applied to the garment to be cut.

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43. For *Castors* to be fixed on the feet of furniture, to be called *Globe Castors;* Walter Hunt, city of New York, April 22.

The roller of this castor is to be a globe, or sphere, of glass, hard metal, or any other suitable substance, which is to be fitted into a socket, or hollow cavity, like a ball and socket joint. At the bottom of the socket, there is to be a cup, or cap, of some hard material, which is to be hollowed out so that the ball shall touch its outer rim only, which outer rim is to be rounded so as to lessen the friction as much as possible. The bearing rim of the cup should be about half the diameter of the ball, the pressure of which it sustains. The socket is to embrace about two-thirds of the ball; its lower edge is to be

notched in, so as to leave the solid part of the socket equal to the depth of half the sphere. The notched part is to be closed upon the ball by a *set*, in order to retain it in its place. To the pieces between the notches, the form of leaves, or other ornamental figures, are to be given. The inside of the socket, below the friction cap, is to be lined with cloth or other soft material, to prevent the entrance of sand, or dust, and it must not embrace the ball so firmly as to check its free motion.

The claims are to the cap with its rim upon which the globe bears; the form of the lower edge of the socket, admitting of its being readily cast whole, and of having its leafed part closed upon the ball; and the general adaptation of the whole to the formation of a castor.

The principal difficulty to be apprehended is the friction which will take place between the globe and the cap, especially in heavy articles of furniture. There are no two metals, however hard, which, without oiling, will run smoothly together for any considerable length of time; and these cannot be oiled. It is proposed to use glass, to the cup, and to bed it in cement; but this would soon be crumbled by hard blows; nor would it obviate the difficulty resulting from friction. If the globe once sticks, a flat side will be formed on it by its rubbing upon the floor; this will eventually be the case, and the operation of the thing is then forever at an end.

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44. For *Passenger Cars for Rail-roads;* John Stephenson, city of New York, April 22.

The wheels of the cars are to pass up within the body of the carriage, under the seats, which are cased over for that purpose, thus allowing the body to be hung much lower than usual. The carriage part is to be suspended under the axles; the boxes which receive them being bolted on to the upper edges of the carriage. The journals, according to the drawing, project through the wheels, and have their bearings on the outside. Leather braces are to rest on the tops of the bearing boxes, and are to be tightened by screws acting on each end of them, which screws are attached to the pillars of the body. The claims rest on the passing of the wheels up into the body of the carriage, and the method of hanging it by the braces.

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45. For a new mode of *Fastening Boats by Screws;* Joseph Francis, city of New York, April 23.

The mode of fastening here patented is applicable to clincher-built, or lap-streak, boats, which when so made the patentee denominates "portable screw boats."

Instead of using nails, spikes, or rivets, as usual, screws, with suitable heads, and with nuts and washers, are employed, both to secure the plank to the timbers, and also in the lap between the timbers. The advantages resulting from this mode of building are enumerated in the specification; among them is the ease with which the joints are drawn together, without any danger of bruising, or splitting, the wood; the facility of repairing, as by removing the screws from the two

edges of a plank, it will at once fall out, and is always ready to be used as a perfect mould for forming a new piece; and the facility with which such boats can be taken to pieces for carriage, and put together when wanted. The putting boats together by means of screws, without nuts and washers, is claimed as making a part of the invention.

Should any danger be apprehended from the working loose of the nuts, it is proposed to give a little extra length to the screws, and to spread them by rivetting; this part, when it is desirable to take the screw out, may be filed off, and the nut will then unscrew.

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46. For a *Soda Fountain;* Jacob Ebert, of Cadiz, in the state of Ohio, and George Dutty, of Wheeling, in Virginia, April 24.

This soda fountain is intended, of course, for a soda water fountain, and a very marvellous one it is. The gas is to be made within the cistern, without any such trouble as that which usually attends the process. A cistern, of copper we suppose, is to be prepared, of the usual form, and through one of its ends a tube is to descend nearly to the other end, in the common manner. The cistern is to be divided into two parts by a partition descending from the top to within an inch or two of the bottom. The tube which rises from the top, has a stop-cock, as usual; and near the bottom of the vessel there are two other cocks, or two screw caps, which serve to close the openings through which the materials are to be put into the cistern, one of them being adapted to it on each side of the partition. This constitutes the whole apparatus.

When the cistern is to be charged, it is first inverted, and the charging holes opened: through one of them a solution of tartaric or *sulphuric* acid is to be put, and through the other a carbonated alkali, as super carbonate of soda, or potash, and the required quantity of water. The holes are then to be closed, and the vessel righted, when the acid and alkali coming in contact with each other, the carbonic acid will be liberated, and the water impregnated by it.

For a fountain containing two gallons, the usual quantity, it is said, is four ounces of acid, and four ounces of alkali.

By this process we should not only obtain soda water, so called, but, with it, we may also take, by way of a blessing, a good dose of Glauber's salts, a solution of vitriolated tartar, cream of tartar, tartrate of soda, or, mayhap, of Rochelle salts. It will be very proper, therefore, for the vender of this water to inform his customers what kind of physic he is presenting to them into their bargain. We had almost forgotten one article which may give great activity to the water, and that is a good portion of blue vitriol, or sulphate of copper, which may stir up the dormant energies of the stomach, and afterwards allay them forever.

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47. For a *Washing Machine;* Larkin Smith, Guilford county, North Carolina, April 25.

This washing machine is to be a cubical box, measuring about two

feet on each side, and is to turn like a barrel churn, upon gudgeons placed on the centre of two of its opposite sides. Four pieces of plank, about eight inches wide, and the length of the inside of the box, are placed within it, one in each of the four revolving angles, dividing them equally; these are to help turn the clothes, and to catch the water, and pour it down as they rise.—There is no claim made.

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48. For *Hulling and Cleaning Rice, Barley, Broom Corn, and other small seeds;* Theodore F. Strong, and Marcus T. Moody, Northampton, Hampshire county, Massachusetts, April 26.

This patent is said to be taken for an improvement upon Strong and Moody's *Huller, Smutter, and Polisher*, patented on the 17th of November, 1832. The seeds are to be sent first through two revolving rubbers, in the form of mill stones, which are to be disks of cast iron, faced with wood, upon which is glued emery, or other hard substance; after this, through a similar apparatus, covered with card teeth, or something analogous; and then through another covered with bristles. Suitable sieves, or riddles, are also provided, and employed after each of these operations.

Instead of rubbers in the mill stone form, it is proposed sometimes to use a truncated cone, and a corresponding hollowed piece, to be covered, however, as above described. The whole apparatus is very much like that referred to as the subject of the former patent, and although this is said to be for an improvement thereon, we are not informed in what the improvement consists; nor is there any drawing of the improved parts. Now, as the patent appears to be for the instrument used, this ought to have been delineated; it can scarcely be pretended that the patent is for a process merely, for there is nothing new in the simple fact of cleaning small seeds, although there may be in the mode of doing it; but this mode must be by particular machinery, which "admits of drawings."

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49. For a *Mowing Machine;* Richard Heath, West Newbury, Essex county, Massachusetts, April 26.

The machine which is the subject of this patent is described in a very brief way, and without any attempt whatever to designate what in it is new; the general construction of it, however, is clearly shown by the aid of the drawing.

A pair of wheels is to be fitted on to an axle tree of four feet in length. Two pieces of timber, ten feet in length, are to be attached firmly to the axle tree, and to project forward from it in the manner of shafts, a cross piece near their extreme ends connecting them together. Through this cross piece a vertical shaft passes, having a whirl at its upper end, and on its lower end, below the shafts, a cross formed of two pieces of timber halved together, and intended to revolve horizontally. Each of the four ends of this cross carries a scythe, the height of these from the ground being regulated by a small truck wheel, or roller, running under the cross. A cog wheel

upon the inside of one of the first mentioned wheels, takes into another upon a spindle, or secondary shaft, revolving above the axle tree. A drum upon this shaft carries a band which passes round the whirl on the scythe shaft, to cause it to revolve. The machine is to be moved either by hand, or horse, power.

The foregoing description is more full than that contained in the specification; and those who know what has been done here and in Europe in the construction of mowing machines, will see that, in point of principle, there is no novelty, or in arrangement, any thing superior, in that now presented; we might say, indeed, that whatever may be its actual performance, it is certainly, upon paper, much less promising than many of those which have preceded it.

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50. For an improvement in *Making Clocks;* Samuel Blydenburg, and William Beebe, city of New York, April 26.

This clock is one of those whimsies, which, although they may manifest some ingenuity, are about as likely to assist the current of time, as they are to interfere with the ordinary mode of telling it. The pendulum of this horological apparatus is to be of the compound kind, with a weight both above and below the point of suspension. The pallets are attached to the pendulum, and act directly upon the escapement wheel. Upon the arbor of this wheel, there is an endless screw taking into a small toothed wheel, and another endless screw working into a pinion which carries the hour hand. These, with a small pulley and weight for a maintaining power, constitute the movement; and the whole specification consists in references to the drawings of these and of their auxiliary parts; at the end of which we are informed that "the above is a plan of a one day clock, and the addition of one more wheel makes it an eight day clock; and the addition of another wheel gives motion to another hand, both which are intended to be embraced by this specification." This constitutes the whole claim, if such it may be called.

In November last a patent was obtained by Mr. J. S. Seger, of New York, for a clock of a similar kind with the one above described, a notice of which will be found at page 315 of our last volume. Although we consider the two as belonging to the same genus, they manifestly differ in their species, and should they be sought after to be placed in the cabinets of the curious, the creative powers of our machinists may multiply this latter division to an indefinite extent.

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51. For a *Machine for Cutting Bogs and Bushes;* Thomas Spring, Granby, Hartford county, Connecticut, April 27.

We thought that bogs were bogs, and that bushes were bushes; that the latter might be cut, and that the former might be drained; but it seems, by the specification before us, that bogs are bushes, and bushes are bogs; or, in other words, that the terms are convertible, and that both of them may be cut by a patented instrument. This instrument is to be in the form of the letter V, the two branches con-

sisting of blades, or knives, with their cutting edges inwards. To the ends of these, horses or oxen are to be attached, and when drawn forward, the bogs, or bushes, collected between them are to be cut down. A handle, or guide, is to be fixed in a socket, leading back from the angular point. The blades are made capable of being set nearer together, or wider apart, being furnished with screws at the angular junction, for that purpose.

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52. For an improvement in the mode of *Hanging the Movable Beaters of the Thrashing Machine;* Holdridge Dewey, Norwich, New London county, Connecticut, April 27.

Several thrashing machines have been patented, the beaters of which are hinged, so that they can yield on striking the grain to be thrashed. Such a one was patented by Mr. Branch on the 14th of April, 1832, upon which the present purports to be an improvement; this improvement consists in checking the motion of the beaters upon their hinges, so that they shall not fall back upon the revolving cylinder, or heads. The claim is to "the mode of attaching the hinges, and the checking the swing of the beaters." The improvement is certainly not of that important character which will form a new era in the art of thrashing grain.

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53. For a *Sawing and Boring Machine;* James Hamilton, city of New York, April 29.

This machine is to be applied to the "sawing felloes of wheels, circular and curved segments, mitre joints, tenons, and also of boring felloes and hubs of wheels, circular, curved, and plain surfaces, and of sawing and boring in various ways."

From the above announcement it will be readily perceived that the machine must be one of considerable complexity, the whole apparatus being contained in one frame. The drawing, which represents it in four different views, has nearly a hundred references to it, and therefore a particular description of it will not be looked for here.

The structure of the claim is such as to confine the right to the general arrangements, substantially, as in this must be found whatever of novelty the machine may possess. The following quotation will serve as an exemplification. "And this applicant, hereby claiming his patent for the combination described, as included in one frame, substantially as the same is above described, hereby further declares that he purposes taking a patent for each of the several parts of his said improvement, or combination; that is, for the combination of the sweep with the perpendicular saw, or saws, and the scales therewith used, constructing and operating substantially as above described," &c. &c.

When these separate patents are obtained, they will afford the proper opportunity of remarking upon whatever may be considered as essentially novel in principle, as regards the inventions of the patentee, and until then we necessarily postpone any such investigation.

54. For a *Helping Power Machine;* William Loomis, Ashford, Windham county, Connecticut, April 29.

We are determined to speak a word in good time on behalf of the patentee of this invention, who will certainly, at an early period, require more help should he attempt to carry his scheme into operation; for, without some extraneous aid, his machine will not only itself stop, but will actually arrest or retard the motion of any other machinery to which it may be applied; or in the words of an old song of an inhabitant of the Emerald Isle, it will "Help the work forward with backward assistance now."

A pendulum, with a heavy weight on its end, is to be suspended to a horizontal shaft, and this pendulum is to be *aided* in its oscillations by two springs against which its rod is to strike, in passing either way. Two ratchet or escapement wheels, upon the pendulum shaft, acting in reversed directions, are to have maintaining weights, which when wound up are to keep the pendulum in motion, and the power thus obtained is to be applied from the pendulum shaft to the propelling of other machinery.

We will take the liberty of suggesting an improvement to the patentee—asking nothing, however, for the suggestion, as we would not put too high a value upon our own rattletraps—but, would it not save much trouble to apply *some part* of the excess of power in this contrivance, to the winding up of its weights?

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55. For a *Foundry Press;* William Blake, city of Boston, Massachusetts, April 29.

This press is intended to be used in foundrys, for forcing the sand into the flask, and is so made as to operate very much like the common printing press, the flask taking the place of the form in that machine. A platten is to be brought down by pulling a lever, like that of the printing press; this lever turns a circular piece of metal which has, upon its lower sides, two inclined, curved surfaces that operate upon two pistons or followers attached below to a descending platten; upon the upper end of the pistons, are friction rollers, bearing against the inclined surfaces before named; the inclination of these surfaces is such as to give a constantly increasing power, like that of the toggle joint. The bed, upon which the flask is to be placed, is run out by turning a crank, the patterns and flask are then placed upon it and the flask filled with sand; a frame is then placed upon the flask which is also filled with sand, struck off level, and on removing the frame a quantity sufficient to be forced into the flask is thus left projecting above it. Such arrangements are made as are calculated to prevent the sand from lodging and obstructing in the process.

This plan is said to give a uniform degree of solidity to the flask, and to save labour to a great extent in that kind of work to which it is applicable; the workmen being able to prepare three times the number of flasks which they can in the common way, and with much greater perfection.

56. For a *Carriage Wheel Guard;* William Zollikoffer, Middleburg, Frederick county, Maryland, April 30.

This guard is intended to hold the wheel should the linch pin come out, or the spindle of the axle break. The method of doing this is one which has been long known, although it is not generally used. Upon the inner end of the nave, or hub, a ring is placed with a projecting flanch, or flanches; and a piece of iron, fastened to the axle, hooks over, or between, these flanches, but does not touch them. When, however, the wheel obtains play, the flanch comes up against the hooked piece, or pieces, upon the axle, and is by them held in its place. These hooked pieces are capable of being loosened when the wheels require to be taken off.

The present patent is not taken for any improvement upon this plan, but goes upon the supposition that it is altogether new.

Specifications of American Patents.

Specification of a patent for a new mode of attaching the Soles to Boots and Shoes. Granted to Samuel D. Breed, *of the city of Philadelphia, April* 4, 1833.

To all whom it may concern be it known, that I, Samuel D. Breed, of the city of Philadelphia, in the state of Pennsylvania, have invented a new mode of attaching soles on to the outsides of boots and shoes, of all descriptions, whether made of leather, India rubber, or other materials, and that the following is a full and exact description of my said invention.

My method of attaching the outside sole on to boots and shoes, is by cementing the parts together by means of a solution of caoutchouc, or India rubber, as a substitute for the usual modes of sewing or pegging. For this purpose, I dissolve India rubber in rectified spirits of turpentine, the essential oil of sassafras, or some other of the essential oils. I, however, prefer the oil of sassafras to either of the others that I have tried. When the shoes are made of leather, I prepare the upper leather and inner sole in the usual manner. I then saturate both soles with the solution of caoutchouc, and if this is made of good materials, they will, in favourable weather, dry in the course of 12 hours. The parts to be cemented are then covered with a portion of the solution; the boot, or shoe, being on a last is placed on a bed, or support, of a suitable form, the outer sole placed on it, and covered by a plate of cast iron, or of any solid material of the proper shape, and submitted to that degree of pressure which shall suffice to bring into contact all the parts that are to be united. The pressure is to be continued until the cement is sufficiently dry, which, in fair weather, I have found to take place in about twenty-four hours.

Soles of caoutchouc or of leather may be joined on to caoutchouc in the same way; and socks, or shoes, of woollen or other cloth may have soles of leather or of caoutchouc attached to them by similar means.

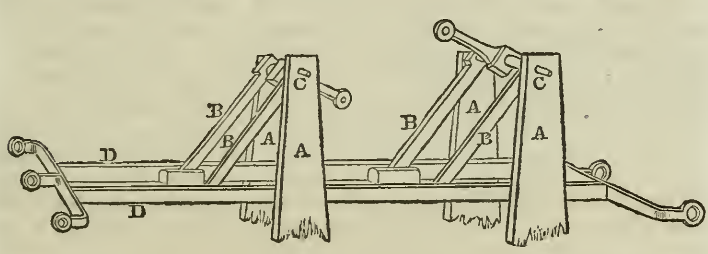
In making the cement above described, I use the articles in such proportions as shall give to the solution the consistency of strong paste.

I do not claim to have discovered the mode of making the solution of caoutchouc by means of the essential oils, this being a process which has been long known; but what I do claim as my invention is the application of this solution to the cementing of soles on to boots and shoes as a substitute for sewing or pegging.

Samuel D. Breed.

Specification of a patent for a new method of Working the Levers of Fire Engines. Granted to Samuel Huse, *of Newburyport, Essex county, Massachusetts, April* 9, 1833.

To all whom it may concern, be it known, that I, Samuel Huse, of Newburyport, in the county of Essex, and state of Massachusetts, have invented an improved method of working the levers of fire engines, and of other similar machinery, and that the following is a full and exact description of the same, reference being had to the accompanying drawing, which makes a part of this specification.



A A A A are standards which serve to support the fulcrums of the levers B B B B, as seen at C C. The lower ends of these levers working on joints in the traversing bars D D.

The uses of the other parts represented in the drawing will be evident upon inspection, and as they make no part of my invention, but are common to many fire engines, they do not require to be described.

The object is to work engines of this description by a traversing motion, the handles being attached to the traversing bars D D, which constantly preserve their horizontal position, and rise and fall no more than is due to the segment of the curve formed by the lower ends of the levers B B.

When an engine is worked in this way, it is necessary to scotch the wheels, or in some other way to prevent a backward and forward motion in the body of the engine. This may be effected in various ways, or if preferred, there may be sliding bolts, or screws, made in the manner of legs, which may descend from the body of the engine, and support it whilst in action, independently of the wheels. I some-

times make the levers work across the engine, and in this case the wheels require but little checking.

I do not intend to confine myself, in carrying my said plan into operation, to the exact mode which I have here represented; but what I claim as my invention is the constructing the working levers of fire engines, and of similar machinery, by attaching the handles thereto, so that the levers shall work backwards and forwards in the manner of a pendulum, upon the principle herein fully set forth.

Samuel Huse.

Specification of a patent for improvements in the Revolving Platform used upon Rail-roads. Granted to John Elgar, *Civil Engineer, city of Philadelphia, April* 12, 1833.

To all whom it may concern, be it known, that I, John Elgar, Civil Engineer, of the city of Philadelphia, in the state of Pennsylvania, have invented certain improvements in the mode of constructing the revolving platform, employed upon rail-roads for the purpose of turning rail-way carriages, and that the following is a full and exact description thereof.

I usually make the revolving platform, and the socket within which the projecting spindle which sustains it turns, of cast iron, as being the most suitable material. The upper side of the platform I, in preference, make convex over a considerable part of its diameter, say to the distance of thirty inches from the centre, giving to it a rise of two or three inches; from this rise to the periphery, which constitutes the part upon which the wheels are to roll and to rest, it is made flat, or has but a very slight inclination towards the outer edge. When the car passes upon this, the advance wheels rise over a portion of the convex part, and having passed this the tendency of the car is to remain in its place whilst the platform is turned. Although I think the convex form of the upper side of the platform the best, it is by no means an essential point, and it may be made flat if preferred.

There are no rails, or grooves, upon the surface of the platform, as it is not intended that the wheels shall be sustained by their tread, but by the edges of their flanches whilst upon it. The platform is consequently placed sufficiently low thus to receive the wheels, and is always in the right position for that purpose, whether intended to pass on, or to be turned round.

The under side of the platform I generally make concave, so that the water which may run from its top will not have any tendency to pass along it towards the spindle upon which it turns; or this may be prevented by the well known mode of forming a rim, or fillet, on the under side at its periphery which descends below the general surface, which, at the same time, serves to strengthen the platform.

From the centre of the platform a spindle descends into a socket prepared to receive it. I usually make the spindle about thirty inches long, about eight inches diameter at top, where it joins the platform,

and tapering down to about three inches at the bottom, where it rests in the socket upon a hemispherical end. These dimensions, however, may be varied according to circumstances.

The socket in which the spindle turns, and which is its only support, has a collar surrounding the cavity, at its upper end, which embraces the spindle; the socket rises into the concavity of the platform, when it is made concave, and approaches near to, but does not touch, its under surface. A projecting flanch surrounds its upper end, which aids in sustaining it firmly in the frame work, or masonry, in which it is fixed. When in its place neither water nor dirt can find its way into the socket, to mix with the oil, or obstruct the action of the machine.

What I claim as my invention, and for which I ask a patent, is the construction of a revolving platform for rail-roads, upon the principle hereinbefore described; that is, to obtain the revolving motion by means of a spindle and socket, without friction wheels or rollers beneath it; and the dispensing with rails and grooves to guide the car; whether the same be constructed in the exact way specified, or in any other producing a like effect, and acting on the same principle.

John Elgar.

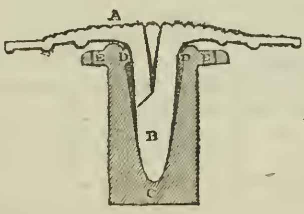
A, platform.

B, spindle.

C, socket.

D, collar.

E, flanch.



Specification of a patent for machinery for washing pulp in manufacturing paper. Granted to Francis Goucher, *Chester county, Pennsylvania, April* 12, 1833.

To all whom it may concern, be it known, that I, Francis Goucher, of Chester county, in the state of Pennsylvania, have invented an improvement in the machinery for washing the pulp, in the manufacturing of paper, and that the following is a full and exact description thereof.

I make an opening in the side, or end, of the washing, or beating, engine, wherever the most convenient or advantageous application of power can be made, and insert a brass or copper vellum of any number to suit the quality of rags to be washed, and sufficiently large, (my present one being fifteen by twenty inches,) to allow a passage for all the water necessary for the operation of washing; and in order to obviate the suction which would arise from having the vellum only in the engine, I attach a box to the outer part of the engine opposite the vellum, and in this box fix a hog, or vertical paddle wheel, the use of

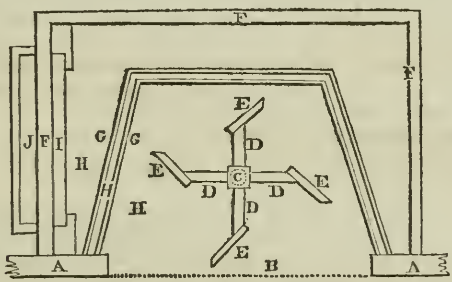
which is to agitate the water against the vellum and drive the rags from contact with it, by which a space is obtained within the engine free from the rags, and an unobstructed passage of the water allowed. The paddles on the wheel are placed at an angle of about forty-five degrees with the arms which pass through the shaft and to which the paddles are attached—this position of the paddles capacitates them for throwing the water more forcibly against the vellum within the box, than by having them (as in the common hog for suspending the pulp in vats,) perpendicular to the shaft. The discharge of the water through the vellum is regulated by a gate in the side of the box, fixed near the top so as to prevent the water sinking below the required height in the engine—otherwise the capacity for discharging the water from the box being greater than the means of supplying the engine, suction would ensue, and thus the function of the hog be counteracted—the skill and attention of the workman must be relied on for the performance of this part of the operation. The suspension of the process of washing is effected by closing the aperture in the box by the gate, and allowing the water to remain stationary therein, at the height required in the engine. It is important that the box should be perfectly water-tight, and for the better securing of this it should be composed of metal, (copper for instance,) or if of wood it should be lined with copper or lead, and soldered at the joints; otherwise a leaking would, by lowering the water in the box, cause, more or less, a constant suction at the vellum, and thereby arrest the pulp in the process of beating; but this inconvenience can be remedied by having the vellum so fixed as to slide in and out of the engine, and a brass or copper plate substituted for it when it is required to stop the washing. In this form of the vellum another advantage would be gained—two or more frames of vellum of different numbers to suit the progressive stages of the rags, could be used, and thus by using first the coarser number of vellum, to allow the more free expulsion of large particles of matter that may be to be washed out of the rags, and then the finer vellum as the state of the rags may admit.

My present box is two feet in length, one foot six inches in breadth, and one foot six inches in height; the vellum in the engine is fifteen inches wide and twenty inches long; this may be varied to suit the size of the engine, &c.; the number of the vellum is thirty, but may be coarser or finer to answer the first and progressive stages of the rags. The revolutions of the hog are eighteen to twenty per minute, which I consider the best velocity for preventing suction, and producing a smooth current in the discharge of the water through the vellum. The paddles of the hog are thirteen inches long, and four inches wide, and the diameter of the hog, from the extent of the paddles, thirteen inches. To prevent the agitation of the water at the aperture of the gate, by which its free discharge would be somewhat affected, I have constructed a box immediately around the hog inside of the other box, leaving a space between the two boxes of three inches wide at the discharging end, and two inches wide at the other extremity, and placed a bottom at three inches depth, being sufficient to carry off all the water which passes through the vellum. The water

rises and flows over the top of the inner box into the box or trough which surrounds it, and thus a smooth stream passes through the gateway. Two or more of these boxes and hogs may be used at different parts of the engine when there is a greater supply of water than can be discharged through one, or the one may be extended in size at pleasure. The driving power may be obtained from the main works (as mine is at present) by small straps and pulleys, and when it is required to stop the hog, a loose pulley is the most convenient means. The bottom of the box should be three or four inches below that of the engine, to allow the settling of the discharged particles of dirt, &c. from the engine, and prevent their running again into the engine, when the hog is stopped—the dirt thus accumulated may be discharged from the box through a plug-hole in the bottom.

What I claim as my invention, and for which I ask a patent, is the fixing of the vellum in the side of the washing, or beating vat, with a box, or reservoir, on the outer side of the vat opposite to the vellum; also the use of a revolving hog in said box, to dash the water forcibly against the vellum for the purpose of keeping it clear from the pulp, and thus allowing the water to pass unobstructed through it; and also the regulating slide, gate, or valve, in said box, or reservoir, to determine the quantity of water which shall flow through; resting my whole claim, not upon the particular parts, but upon the general arrangement of the apparatus as above described, whether the same be constructed in the exact manner herein set forth, or in any other operating upon the same principle, and producing a similar effect.

FRANCIS GOUCHER.



This drawing represents a horizontal section of the box, and of the hog, and other parts appertaining to it.

A A, a part of the side of the vat. B, the edge of the vellum covering the opening between it and the box, represented by a dotted line. C, the axis of the hog. D D, arms carrying the dashers E E. F F, edges of the box. G G, edges of the interior box. H H, spaces for water. I, edge of the gate to regulate the flow of the water out of the box J, opening into, and through which, it flows after escaping by the gate.

Specification of a patent for a Rotary Steam Generator. Granted to Hardin Branch, *city of New York, April* 12, 1833.

This rotary steam generator consists of the following principal parts; viz. the vat, or cistern, to contain the fluid to be reduced to steam, and to be condensed; the pipes to convey the fluid and steam; the boiler, kettle, caldron, or receiver, in which the fluid is heated and converted into steam.

The *cistern*, or *vat*, is made of wood, and is about twelve feet long, six feet wide, and four feet deep; flaring about one foot wider at the top than at the bottom; the whole may be lined with boards, tin, or copper. A false bottom, made of inch boards, is placed about four inches from the true bottom, resting on scantling; this false bottom and scantling are thickly perforated with small holes and gains. The cistern is covered closely with folding lids, well matched together.

The *boiler*, or *kettle*, is made of metal, of any required form, to contain from 75 to 125 gallons. It is closely covered on the top with plank, packed well in the grooves with linen or oakum. At the bottom of the kettle is an opening to receive a pipe, and also one on the top, or lid, for the same purpose.

A pipe, made of wood, or of metal, about twelve feet long, and four inches diameter, extends from near the bottom of the boiler, or kettle, to near the bottom of the cistern, or vat: another pipe of about the same diameter, and about six feet long, is placed vertically at right angles with the lower one, and jointed to it closely in the cistern: another pipe of the same dimensions as the first mentioned, or lower one, is placed parallel with it, and joined to the upright pipe, and to another upright pipe from the boiler; forming together a parallelogram of pipes from the boiler to the cistern. Both the vertical and longitudinal ends of the pipes which enter the cistern, are perforated with small holes.

A *stop-cock* is placed in the vertical pipe in the boiler, to let off the steam when required; and a cork, or plug, is placed at the bottom of the cistern to let off the water.

The cistern may be divided into different compartments to contain the articles to be operated on by the steam; the divisions must be perforated with small holes like the pipe and false bottom. One of the lids may be fastened down, and the other loaded as a safety valve.

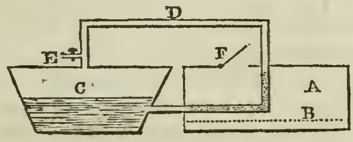
Operation.—The articles to be cooked or operated on by the steam, are placed in the compartment of the cistern; water, or other fluid, is then poured into the cistern; this enters the lower pipe through the holes, or perforations, and flows into the boiler or kettle; the fire then converts the liquid into steam, which ascends through the vertical pipe in the boiler, and along the upper longitudinal pipe, and descends the vertical pipe in the cistern, and after coming into contact with the articles to be operated on, is condensed by the cold water, or fluid, until by continual circulation the whole becomes heated, and the articles placed in the compartments of the cistern fully cooked, or fully acted on.

It is intended to apply the above apparatus to domestic cooking, chemical operations, tanning, currying, and all purposes where an extract is required from any substance.

The invention here claimed consists in the before described method of causing steam to perform a rotary operation, or circulation, by which the whole effect of the heat is used, in all the operations of cooking, or of making extracts.

HARDIN BRANCH.

A, the cistern.
B, perforated bottom.
C, boiler.
D, circulating pipe,
E, Stop-cock.
F, Cover serving as a valve.



Remarks by the Editor.

A place is given to the foregoing specification, because we happen to have a copy of it by us, not that we perceive any thing in the affair which is likely to revolutionize our kitchens, but few of which would contain an apparatus so magnificent in dimensions; should its utility be at all commensurate with the space it is to occupy, it is much to be regretted that the inventor has not afforded us more instruction as relates to the mode of applying it. We are even at some loss in attempting to trace the *circulation* which is intended to take place among its fluid contents.

From its size, this might be called a National Steam Cooking Apparatus; we hope its boiler may not burst, as the broth would then be spoilt, and all the fat be in the fire.

ENGLISH PATENTS.

To ROBERT STEIN, *gentleman, for his having invented certain improvements in distillation. Sealed 4th December,* 1828.

The subject of this patent is a still, or rather a distilling apparatus of a very complicated construction, the leading object of which appears to be that of presenting the wash, or fermented liquor, to the heat in an extremely attenuated form, or finely divided state, that is, in jets, or a shower, or, as the patentee expresses it, in the state of a mist.

The wash descends from the vat by a pipe, which conducts it through several vessels called baths, as they are surrounded by hot chambers formed by casings, or outer vessels, which constitute the passages for the steam or vapour emitted from the still to pass to the refrigerator. By these means the wash becomes heated, and the vapour cooled.

In describing this invention, we must commence at two opposite ends of the apparatus at the same time, namely, at the reservoir, on the right hand, from whence the cold liquor flows through the heated

vessels into the still, and at the boiler on the left, from which steam is passed through the still and round the wash vessels to heat them.

Bearing in mind these two prominent features, let it be observed that the still itself stands about midway between the boiler on the one hand, and the wash vat on the other; and is totally unlike stills in common use, being a long, cylindrical vessel placed horizontally, and divided into several compartments by vertical partitions made of thick cloth.

The wash, after passing through three several vessels, each surrounded with a casing filled with steam or hot vapour, is conducted in a heated state by a series of pipes leading respectively to a small force pump, connected to each of the compartments of the cylindrical still. These pumps are all acted upon by one large piston working in a cylindrical vessel, into which the wash is delivered by the pipes, and from whence it is ejected through the pumps.

Here one important feature is to be remarked:—each pump has an air vessel connected to it, by which an elastic pressure is exerted upon the surface of the wash as it rises in each pump barrel, and by that means, when the piston is set to work, the wash is thrown into the several compartments of the still in continued jets. In order, however, to divide the wash into the most minute particles, as a shower, or a mist, a plate is placed a little distance above each jet within the still, for the purpose of distributing the wash when it strikes upward, and causing it to be scattered widely over the still, and thereby become greatly exposed to the action of the heat.

Having explained the manner in which the wash is distributed in a shower, or mist, within the still, we proceed to show the mode by which it becomes heated; this is effected by the passage of steam through the still.

As before said, a boiler is placed at the left hand end of the apparatus, from whence steam rises, and is introduced into the left hand extremity of the cylinder. There it mixes itself with the heated wash in the finely divided state described, and carries away those portions which are reduced by the heat to an alcoholic vapour. The cloth partitions of the cylinder are close enough to prevent the passage of the wash from one compartment to another, but yet allow the steam and vapour to pass on to the end of the cylinder, and thence to escape through a pipe to the jacket of one of the wash vessels, when it becomes partially condensed; but that portion which remains in a state of vapour, proceeds onward to the jacket of the second wash vessel, and from thence to the third: and ultimately the most volatile part of the vapour passes down into the worm or refrigerator, and is then condensed in the form of concentrated spirit, or alcohol, from whence it is taken for rectification.

Referring again to the consideration of the wash, it is to be observed that it flows first from the reservoir placed at an elevation, into a vessel surrounded by a jacket containing the heated vapour which passes from the still, as before described; and the effect of this is, that the vapour becomes partially condensed by the cold wash, whilst the wash is heated by the hot vapour.

The wash on flowing into the second and third vessel, and the vapour passing round them, in like manner effects a transmission of the heat, which assists in condensing the vapour prior to its reaching the worm, and of heating the wash before it is injected into the still.
[*Lond. Jour.*

To JAMES FRASER, *Engineer, for his having invented or found out a new and improved arrangement of a flue, or flues, to communicate with the various parts of culinary apparatus, such as steam, soup, or water boilers, oven, or ovens, hot plate, or plates, hot closet, or closets, and stewing stove, or stoves, to render them more compact; and to appropriate parts of the said apparatus to effect other useful purposes.—Sealed 27th January,* 1829.

The subjects of this patent are divided into "*two series,*" as the patentee expresses it; that is, the adaptation of the invention, first, to a portable cooking apparatus, as a ship's hearth, and secondly, to a permanent cooking range, with oven and boiler to be fixed in the kitchen of a mansion.

The features of novelty, if there are any, connected with this invention, consist in the precise construction, arrangement, and disposition of the fireplace, flues, boiler, oven, hot plate, air vent, &c. as set forth in a series of figures accompanying the specification. As, however, these several parts of a cooking apparatus have been so variously contrived as to form a disposition in the many inventions for similar purposes which have formed the subjects of previous patents, we find ourselves, in the absence of any definite claim, unable to point out any peculiar features which we should consider to be new.

The flame and heated vapour pass from the fire in the grate under a hot plate for stewing, and then partly round an oven, and partly under a boiler, and from thence, through flues, proceed to a chimney, after having completely exhausted their heating powers.

There are dampers for shutting off the current of heat from the boiler if desired, and for directing it to any other part of the apparatus, but none of these appear to be capable of producing any new or superior effect; and the only part which is particularly insisted upon as of importance in the arrangement, is a tube, or chimney, for conducting the steam and hot air from the stewing plate, which does not communicate with the chimney, and therefore prevents the possibility of smoking the victuals while cooking.

The forms of the ship's hearth, or portable cooking stove, and the stationary stoves for the kitchens of mansions, of course differ considerably in external appearance, but a similar arrangement of the parts occurs in both, and the same apparent want of novelty presents itself; we therefore deem it unnecessary further to describe this invention.
[*Ibid.*

To Joseph Amies, *paper maker, for his invention of certain improvements in the construction of apparatus to be employed in making paper. Sealed September* 29, 1832.

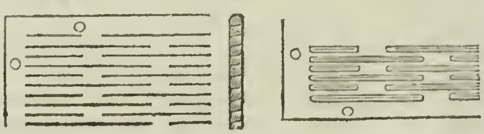
The following is the description of Mr. Amies' invention, in his specification of the above patent.

"My improvements in the construction of an apparatus to be employed in making paper, consist in a peculiar mode of constructing the bottom of a strainer or sieve to be employed for arresting the knots and lumps in pulp prepared for making paper, and in adapting the said sieves or strainers to that purpose.

"Small particles of dirt, as well as knots, lumps, and other impurities which are found accidentally mixed with paper pulp, being greatly injurious to the paper when finished. Strainers or sieves have been employed to prevent those particles, knots, or lumps, from passing with the fine fibres into the vat, or vessel, from which the pulp is immediately taken to mould the sheets of paper. The bottoms of these sieves, or strainers, have, however, been heretofore so constructed, by combining long bars or rods of metal fixed in the frames, or held together near their extremities, as to allow of very considerable vibration when the sieves, or strainers, are applied to the intended purpose. This vibration of the bars or rods, caused them to bend and become loose, and consequently to leave openings in the sieves, between which the knots and lumps were allowed to escape with the fine pulp into the making vat, thereby defeating the object intended. My improvements are therefore designed to correct this inconvenience, and are effected in the following manner:—

I form the bottoms of my improved sieves, or strainers, from plates of brass, or other suitable metal, and produce the apertures for the fine fibres of pulp to pass through by cutting short slits through such plates, taking care that sufficient space of metal is left between the ends of each short slit, and the next following, as will properly brace or strengthen the sieve or strainer. And I prefer that the end of one slit shall be nearly opposite to the middle of the two slits next adjoining it, which is commonly called breaking the joints. This is for the purpose of giving stability to the bottom of the sieve, or strainer, and constitutes the main feature of improvement which I claim in the construction of sieves, or strainers, applicable to the above purpose.

Fig. 1. 3. 2.



Figures 1, 2, and 3, represent a portion of a sieve bottom, with short slits, cut in the way described. Fig. 1 shows the face or upper surface of the plate; fig. 2, the back or under surface of the same;

fig. 3, is a transverse section of the plate. Having prepared a plate of brass, or other suitable metal, of about half an inch in thickness, its surface being smooth, I draw a series of parallel lines across the plate, at about a quarter of an inch apart. In the under surface of the plate, in the direction of these lines, I then form grooves by means of a ploughing tool, or other convenient instrument, taking care that the extremity of each alternate groove reaches to about the middle of the next groove on each side. I then, by a circular saw, or other suitable means, cut narrow slits at the bottom of each groove, of about the thirteenth of an inch wide through the plate. By this means a sieve, or strainer, is formed with narrow slits or elongated apertures, capable of allowing the fine fibres of the pulp to pass through, but stopping, or arresting, the knots and lumps. By the parts of the plate at the ends of the slits being thus left solid, and those solid portions intervening alternately between the middle parts of the two slits next adjoining, the whole plate will be firmly held together, and subject to much less vibration, or liability of bending, than long rods, or bars, which are secured at their extremities only; or of plates with long slits extending the whole length, or width, of the sieves.

In applying these sieves, or strainers, to the purpose of separating the knots, lumps, and other impurities from paper pulp, I mount the sieve in a frame, and subject it to a vibratory or jogging movement, for the purpose of assisting the progress of the fine fibres of the pulp through the slits, or apertures.

Having described the particular features of my improved sieve, or strainer, and the mode of applying the same for separating the knots, or lumps, from the fine fibres of paper pulp, I desire it to be understood, that I do not intend to confine myself to any precise length or width of the slits to be cut in the plate, forming the bottom of the sieve, nor to their distance apart, or to the thickness of the plate from which the strainer is made, all of which will depend upon the quality of the pulp to be operated on, and the speed with which the strainers are to be moved, and their dimensions, observing that the slits must not be cut completely across the plate, as that would separate it into bars; but the slits must be cut in short lengths, leaving a portion of the solid plate between the ends of each short slit; and I recommend that the slits should be so cut that two short slits in one line may terminate near the middle of the next parallel slit on each side, which will most effectually brace the parts of the sieve together, and prevent the partial vibrations complained of; but the slits may be made in rows in a line with each other, sufficient metal being left between the ends of the slits to brace, or strengthen, the sieve, or strainer, which arrangements may be found to answer the purpose; but I prefer making them as above particularly described.

Lastly, in adopting sieves, or strainers, made as above described to the separating of knots, or lumps, from the fine fibres in paper pulp, I do not intend to limit myself to the lever action and tappet wheel by which the sieve is made to vibrate, but employ, if it should be found more convenient, any other mechanical contrivance capable of pro-

ducing the required vibratory action, and I adapt these sieves to the straining of paper pulp, either for the use of hand mould vats, or of paper making machines. [*Ibid.*

¶ TRANSLATIONS FROM FOREIGN JOURNALS.

[TRANSLATED FOR THIS JOURNAL.*]

On the accidents which have occurred in the Coal Mines of the Department of the Loire from 1817 *to* 1831.

The Department of the Loire is one of the most highly favoured in France, in regard to mineral industry. Besides many iron and lead mines, it contains fifty-six coal mines, comprising a level surface of two hundred and seventy square kilometres (about 161 English square miles,) and including ninety separate centres of operation.

The establishments give employment to more than three thousand hands, with four hundred and sixty horses, and eighty-eight steam engines, of an aggregate power exceeding that of two thousand horses. These mines alone afford nearly as much coal as the other thirty-one departments where that mineral is found.

The comparative estimate of products during the last fifteen years, and the examination of different accidents that have befallen the workmen, offer results of interest, which may be seen in the table annexed to this article.

The amount of products and the number of workmen have been gradually increasing for the last fifteen years, as shown by the table; and from 1824, the time when the ground was regularly appropriated and order established, both the produce and number of workmen have augmented in a regular ratio.

The produce of 1831 is to that of 1817, as 17 to 10, and this proportion is an unequivocal sign of the existence of many branches of industry for which coal is either directly or indirectly necessary.

The quantity of coal dug out by a workman has varied from 1847 to 2287 métric quintals, (1819 to 2252 tons,) the average being 2097 quintals, (2035 tons.)

Since 1824 the number of killed and wounded among the workmen has been generally less than in the preceding years.

From the last columns of the annexed table it appears that the falling in of the ground in the subterraneous works has been the principal cause of accidents. This source of danger is inseparable from the nature of the works, and it is only by prudence and vigilance that accidents from it can be rendered less frequent.

The second source of accident is owing to the explosion of the fire damp. The directors and engineers of mines have constantly endeavoured to overcome the prejudices and inveterate habits of the miners, among whom they have at length succeeded in introducing the safety lamp invented by Sir Humphrey Davy; and it is satisfactory to observe that since the period of its introduction, in 1825, the number of victims has been considerably less.

* At the request of the Committee on Publications.

It has been remarked that Mondays are the days of the week on which most accidents happen, and this circumstance is to be attributed to the causes of accidents operating on Sundays, during the absence of the workmen.

Although most of the mines possess funds for the relief of the families of workmen, this resource has often proved inadequate; but the owners of the mines, and the inhabitants of mining districts have generously vied with each other in assisting the families rendered needy by these accidents. The government has also relieved many sufferers, and more than 4000 francs were distributed for that purpose in the year 1831.

Years.	Workmen employed.	Raw produce in metric quintals.*	Quantity of coal extracted by a workman.	Number of workmen killed.	Number of workmen wounded.	Total number of killed and wounded.	Number of workmen injured by each kind of accidents.		
							Crushes.	Gas explosions.	Falling of beams, planks, &c.
1817	1,825	3,879,840	2,135	18	27	45	22	18	5
1818	1,915	3,901,632	2,037	14	37	51	26	15	10
1819	1,927	3,337,938	1,732	20	16	36	25	7	4
1820	1,945	3,800,066	1,873	20	38	58	16	21	21
1821	2,038	4,034,910	1,979	19	33	52	19	11	22
1822	1,959	4,213,586	2,150	25	26	51	19	18	14
1823	2,259	4,513,451	1,998	32	16	48	20	19	9
1824	2,514	5,567,959	2,055	12	19	31	9	10	12
1825	2,814	5,103,886	1,956	21	21	42	21	4	17
1826	2,708	5,605,000	2,069	26	30	56	19	17	20
1827	2,733	6,252,863	2,287	17	11	28	22	1	5
1828	3,190	6,663,367	2,089	28	11	39	20	1	18
1829	2,970	6,232,900	2,098	46	16	62	16	33	13
1830	3,029	6,834,995	2,256	30	29	59	31	2	26
1831	3,053	6,342,430	2,077	30	10	40	14	2	24
Total	36,879	76,284,823		358	340	698	299	179	220

[*Annales des Mines.*

Analysis of Cow Dung.

It is known that cow dung is frequently used by dyers to cleanse printed cotton from that portion of the mordant which has not been perfectly incorporated with the cloth. The importance of this operation is easily seen, for if the superfluous mordant were not entirely removed, it would weaken the dyeing bath, and might fix the colouring matter upon parts which should have remained white. Though the property possessed by this animal matter, of carrying off the ex-

* 10 quintals make 9.85 cwt. English.

cess of mordant, by forming an insoluble compound with it, is generally known, it was not known which of its component substances has the property of uniting with metallic oxides, thereby effecting the cleansing of the cloth. M. Morin, a member of the Royal Academy of Sciences at Roan, has made an analysis of cow dung, from which it appears that this substance contains, besides some other principles, which are not very abundant in it, a peculiar matter which is soluble in water, and has the property of precipitating most metallic solutions, and which, therefore, seems to be the principle which confers the important property stated above.

As this principle, called by M. Morin *bubuline*, from the Latin word *bubulum*, (the excrementitious matter of the cow,) is very soluble in water, whilst the other substances associated with it are but little, if at all, so, it might be exclusively employed by dyers. To obtain it in solution, treat the cow dung with water, and filter; this solution will save the trouble of frequent washings of the dyed stuffs now necessary in order to free them from the encumbering mordant.

[*Receuil Industriel*, No. 72.

On the advantages of a short Arc of Vibration for the Clock Pendulum. By Mr. Edward Sang.

Read before the Society for the Encouragement of the Useful Arts in Scotland, 6th February, 1833.

A long intercourse with persons engaged in all the departments of machine making, has brought before me many erroneous ideas. At first I contented myself with exhibiting their fallacy as I met with them, but continued experience has convinced me that a systematic and public exposure of their nature would be of advantage to engine makers. Following up that conviction, I have projected a series of papers, two of which are already before the Society of Arts. In this, the third one, it is intended to exhibit the impolicy of long sweeps for clock pendulums, and to correct that taste which renders such movements more saleable.

In these papers, of course, I do not offer my remarks to those who, with laudable zeal, have possessed themselves of a complete knowledge of the subject. Intended for those only whose inattention, or whose want of opportunity, has prevented the acquisition of such knowledge, these remarks can hardly claim the notice of the initiated, unless, on the simple ground, that they tend to remove that barrier which separates scientific from practical men. Prevented from employing the refined and powerful methods of modern analysis, or even from adverting to the truths presented by the simple sciences, I am reluctantly compelled to combat error by assertion, and to attempt the removal of one prejudice through the agency of another.

In the present case, it would be vain to introduce an investigation of the law of motion in circular arcs, since no horologist who is able to follow that investigation can be partial to the long sweeps. Among those who are unable to follow it, an indistinct idea prevails that the motions of the pendulum may be subjected to calculation: neither

that calculation, indeed, nor the principles on which it is founded, have they subjected to examination; but then the idea of applying the pendulum to the measurement of time was first entertained by one profoundly skilled in science,—the balance-spring, the fusee, and the compensations for thermal expansion, were all results of scientific research; and it may not be impossible, say they, that, from the same mysterious source, an exact knowledge of the influence of long and short arcs on the going of a clock, may be obtained. And thus, although they do not fully appreciate the force of theoretical results, they are not yet prepared to contradict them. Such is the kind of argument to which I must appeal in support of the statements I am about to make.

If, when the pendulum of a clock is making exceedingly minute vibrations, it be adjusted to true time, and if the arc be then lengthened, the duration of the beat will be increased also. At first, this increase will be exceedingly minute, but as the arc enlarges itself, the interval between two beats will augment more and more rapidly, until the slightest change on the arc of vibration will produce a sensible effect on the clock's going. I have computed and arranged in the annexed tables, the exact amounts of the changes corresponding to each of the first twenty hundredth parts of the semicircle; by the help of these tables, we are enabled readily to compare the performances of pendulums with long or short sweeps.

Suppose that we had a clock regulated to true time when its pendulum swept an arc of twenty centesimal degrees on each side of the vertical line, and then let the maintaining power on account of the thickening of the oil, or from any other cause, be reduced to one-twentieth part, the pendulum will, keeping no account of the resistance of the air, vibrate on nineteen degrees on each side, and its daily rate will therefore be accelerated 52″ 235.

Conceive now, by an augmentation of the weight of the pendulum, and a consequent increase of friction on the knife edge, the maintaining power becomes sufficient for a sweep of only one degree on each side of the vertical line; and, having again adjusted the clock to go in true time, let the same diminution take place in the maintaining power, the arc of vibration will then be contracted to nineteen twentieths of a degree on each side, while the daily rate will experience an acceleration of 0″ 130, or rather less than the four hundredth part of the former.

When we consider then, the mere action of gravity, the superiority of the heavy pendulum with the small arc of vibration, over the light pendulum with the long sweeps, is obvious; the variation in the state of the oil, and the other inequalities of the escapement, exerting less influence on the former in a ratio duplicate of that of the arcs of vibration.

That part of the error of a clock's going which arises from variations in the buoyancy of the air, attaches alike to all pendulums of the same material; but that part which arises from the variable resistance of the atmosphere, is much less felt on the heavy pendulum. Returning to our former case, the velocity of the heavy pendulum

will be twenty times less than that of the light one, so that the resistance of air on a given extent of surface will be 400 times less; the quantity of surface, however, is 7368 times greater, while the distance through which the resistance acts is twenty times less, so that, in all, the influence which that resistance exerts in counteracting the maintaining power, is lessened 1085 times; and hence that irregularity in the going of the clock, which arises from the variable resistance of the air, will be less 400 times 1085, or upwards of 400,000 times.

On account of the increased weight, the friction on the knife-edge is increased twenty times, while the distance through which it acts is diminished as often, so that, in the case of the heavy pendulum, the friction on the knife-edge interferes with the maintaining power just as much as in the case of the light one; variations, then, in this friction, will only produce the 400 part on the disturbance on the clock's rate when the heavy pendulum is used; the edge, however, will require to be somewhat strengthened, so that this circumstance will interfere a little with these proportions.

The retardation of a clock, when the arc of vibration of its pendulum is increased, is by no means so trifling as is generally imagined; the table, I am convinced, presents results much greater than were anticipated by many, even of those who are conversant with the subject. In the formation of the table, I have taken every precaution to insure accuracy, having carried the logarithms to ten decimal places, so long as I adhered to the decimal division, and employed the ordinary tables to seven places only, in passing from that to the ordinary division of time. These circumstances, joined to that of its being new, will render it acceptable to men of science.

These statements may be confirmed by a very simple but beautiful experiment. Having suspended a leaden ball by means of a slender thread, let this simple pendulum be put in motion, so that a ball may describe curves known to bear a considerable resemblance to the ellipse. If the times of vibration along the two axes of this curve were exactly equal to each other, the ball would repeatedly retrace the same orbit; but these times of vibration are different, and during the passage from end to end of the long axis, the ball has more than returned to its position in reference to the short one, so that the axes of the orbit are gradually displaced in the direction of the movement of the ball. This displacement will be found to be most rapid when the orbit is large; as that orbit gradually contracts, the displacement of the axes becomes more and more retarded, until when the evagations do not exceed three or four degrees, it ceases to be perceptible.

To these remarks on the advantages of pendulums with short arcs of vibration, it must be added, that great practical objections lie against their being made very small; these objections, however, are founded on the peculiar nature of the escapements generally used, and, perhaps, derive additional strength from the reluctance to depart from long established, although arbitrary, rules. The beautiful escapement which lately gained the Society's highest prize, when applied, with proper precautions, low down on the pendulum rod, obviates all these objections, and offers the prospect of immense improve-

ments in time keeping. A movement on this plan is already in a state of forwardness, and I shall take pleasure in reporting to the Society he result of experiments made with it.

Half arc.	Time of vibration.	1st. difference.	2nd. difference.	3d. difference.	Clock's daily retardation		
.00	1.00000 00000	0154215	308455	080	″ 000.000	1.332	2.666
.01	1.00001 54215	0462670	308535	129	1.332	3.998	2.663
.02	1.00006 16885	0771205	308664	185	5.330	6.661	2.666
.03	1.00013 88090	1079869	308849	235	11.991	9.327	2.664
.04	1.00024 67959	1388718	309084	289	21.318	11.991	2.664
.05	1.00038 56677	1697802	309373	341	33.309	14.655	2.664
.06	1.00055 54479	2007175	309714	394	47.964	17.319	2.664
.07	1.00075 61654	2316889	310108	447	65.283	19.983	2.664
.08	1.00098 78543	2626997	310555	501	85.266	22.647	2.663
.09	1.00125 05540	2937552	311056	554	107.913	25.310	2.662
.10	1.00154 43092	3248608	311610	611	133.225	27.972	2.663
.11	1.00186 91700	3560218	312221	658	161.195	30.635	2.661
.12	1.00222 51918	3872439	312879	720	191.830	33.296	2.662
.13	1.00261 24357	4185318	313599	769	225.126	35.958	2.661
.14	1.00303 09675	4498917	314368	830	261.084	38.619	2.660
.15	1.00348 08592	4813285	315198	879	299.703	41.279	2.659
.16	1.00396 21877	5128483	316077	942	340.982	43.938	2.660
.17	1.00447 50360	5444560	317019	992	384.920	46.598	2.658
.18	1.00501 94920	5761579	318011		431.518	49.256	2.657
.19	1.00559 56499	6079590			480.774	51.913	
.20	1.00620 36089				532.687		

[*New Edinburgh Philos. Jour.*

¶ *On the application of Steam, expansively, in Cornish Steam Engines.*

By E. Galloway, Esq., Civil Engineer.*

The anxious attention which has been for some time devoted to the steam engine, with a view to its more efficient application to the propulsion of vessels, having induced an inquiry into the alleged superiority of the Cornish engines, I was solicited, in the early part of the last year, to ascertain, by experiment, the nature of the improvements,

* The reader who is familiar with the steam engine in our country, will recognise that in those conducted with special regard to economy, all the devices so much lauded in this paper are of common application: as we do not understand the author to make claim to the merit of the applications for the Cornish engines, we consider that special remark would be out of place. Com. Pub.

and the amount of advantages assignable to each. I therefore devoted several weeks to a succession of experiments on various engines, all of which tended to confirm the accuracy of the printed reports, having in every instance, found the performance to exceed, considerably, the amount stated therein.

It will not be necessary for me to describe the mode of estimating the duty of the engines in Cornwall, further than to state that the term "horse-power," which we use to express the power of a steam engine, is never used in Cornwall. As these engines are principally employed in drawing water from the mines, it is the practice to express the duty of an engine by the number of pounds it raises in a given time to the height of one foot. This is ascertained by multiplying the weight lifted in a stated period, by the height, in feet, it is lifted. Thus, if we lift 1000 pounds of water twenty feet high per minute, it would be equivalent to 20,000 lifted one foot high. The *power* of an engine, therefore, is expressed by the number of pounds it can lift one foot high in a given time; and its *expenditure* of fuel, and consequent efficiency, by the number of pounds it lifts to the height of one foot with one bushel of coals. The comparative merits of different engines, therefore, whatever be their power, or the depth of the mines, are easily ascertained by this simple process. Thus, if we describe an engine to lift one hundred millions of pounds one foot high per hour, we ascertain its *power;* but if we say it lifts one hundred millions one foot high, whilst it consumes two bushels of coal, we ascertain the work done with one bushel of coal; and by comparing that performance with that of another engine, during the consumption of the same quantity of fuel, we thereby ascertain the comparative efficiency of the two engines.

The common mode of expressing the power of a steam engine, in other parts of the kingdom, is, as I said before, by the use of the term "horse-power," which term first arose from the steam engine being employed in substitution of the labour of the horse. This term, however vague at first, has, from long use, become as expressive as any other, and conveys to those who understand it, as definite an idea of the power of the engine, as the more intelligible mode adopted by the Cornish engineers. It is only necessary to know that the power of a horse is estimated at 150 pounds lifted 220 feet per minute, or 33,000 pounds lifted one foot high per minute, and we can instantly compare the power of an engine estimated by horse power, to the power of one estimated by the Cornish method.

An experiment made by Mr. Rennie, at the instance of the Admiralty, having been tried a short time previous to my visit to Cornwall, I was induced to experiment on the same engine—Wilson's engine at Wheal Towan; and being desirous of ascertaining the maximum of effect that could be obtained by the engine being in its best possible condition, I gave such intimation of my wishes to the engineers as enabled them to have every part of it in its most efficient state. The experiment was made in the presence of Capt. N. Vivian, (to whose polite attention I am indebted not only for the opportunity of making the experiment, but for the facilities afforded me during the process,)

Mr. West, engineer, and several others. The result was, that, during six hours and five minutes, the engine consumed ten bushels of coal, raising 125,749,330 pounds one foot high with each bushel; whilst, during Mr. Rennie's experiment, the same engine only raised 92,327,000 pounds per bushel. To prevent scepticism regarding this extraordinary performance, I have to state, that, as a check on the action of the pumps, I had cisterns fitted with sluices at the top of each lift; and, at various periods during the experiment, I ascertained, by shutting down the sluices, the quantity of water delivered into each cistern by a single stroke of the engine; so that having previously ascertained the distance between each lift, and the capacity of the cisterns, an error was impossible. A very trifling difference of result was obtained by the two modes of calculation. The coals were weighed, and the stock of coals on the premises locked up during the experiment.

The best engines by Boulton and Watt, are estimated as capable of raising 19,800,000 pounds per bushel of coals. The Wheal Towan engine, therefore, during my experiment, performed *upwards of six times the duty of Boulton and Watt's engines!*

In my inquiry into the cause of this extraordinary, and almost incredible, performance, I shall first point out every variation from the Boulton and Watt engine, and then estimate, as far as is practicable, the proportion of advantages belonging to each.

The variations are—

1st. *Cylindric boilers* of considerable length. A large tube passing concentrically through them. Fire applied in the tube, and heated air made afterwards to circulate first under, and then along the sides of the boiler. The area of the side flues are generally as large as the area of the tube, and the passage is contracted by a damper being placed in the tunnel, from the boiler, to the stack or chimney.

2nd. *In the management of the fire itself.* The fire is large and thick: the fire doors open nearly to the full breadth of the tube: the coals are spread, or dusted, over the surface of the fire—the fire is *never stirred or stoked*, except at the time of cleansing. The fireman, in cleansing, (about once in twenty-four hours,) first shuts down his damper to prevent the rush of cold air, which would otherwise lower the steam in the boiler, and turns the good fuel on one side, and raking off the clinkers (the only refuse,) turns the fuel back on the clean bars, and performs the same operation with the other side. The fire, before cleansing, is about six and a half inches deep, and, after cleansing, about three to three and a half. By closing the dampers, no decrease of steam is observable during, or after, the operation of cleansing.

It is a singular fact, that those coals are preferred which, in a brisker fire, clinker most; none but Welsh coals have hitherto been used. The coal which is preferred is a mixture of various Welsh coal. The Swansea coal, however, is, I think, equal in its effect. Slannelly coal is strongly recommended, and I have since tried it with effect. Brindoway coal is spoken of very highly, and appears to possess decided advantages over the coal generally used in steam vessels; but its merits, compared to those I have mentioned, are not known.

3d. *In using steam of twenty or fifty pounds on the inch, and in expanding the steam, by cutting off the communication between the boiler and cylinder, at one-fourth or one-fifth of the stroke.*

4th. *In covering, or "cloathing," the boiler, steam pipes, steam chests, and cylinder, with a non-conducting substance, such as saw-dust or straw, where the heat of steam only can be in contact; and "cob," that is, clay and straw, over the brick work of the fire.*

5th. *In suspending the action of the piston at the completion of its stroke, allowing time for the perfect condensation of the steam in the cylinder before making the returning stroke.*

1st. *Improvement on the Boilers.*—The quantity of water evaporated with one bushel of coal, was, according to Mr. Watt, something more than eight cubic feet, converting it into steam at 220 degrees. Tredgold states, that he has evaporated ten cubic feet;* eight cubic feet is, however, found in practice to be about the mean quantity evaporated by a bushel of coal with the common boiler. During my experiment at Wheal Towan, there was evaporated 310.824 cubic feet of water, or 13.824 by each bushel of coals; being an increase of steam generated by one bushel, as 13.824 : 8.

These improvements seem principally to be effected by the judicious mode of causing the heated air to circulate through the flues, so that, as it decreases in temperature, it is made to act on colder water, which will, of course, occupy the lowest part of the boiler. More caloric is thus abstracted from the current in the flues of such boilers than where, as in the common boiler, the flues are constructed without regard to this effect.

It is, perhaps, impossible to ascertain how much of this increase of effect belongs to the management of the fire, and how much to the subsequent circulation of the caloric through the flues. Although such enormous increase of duty has arisen by the improvements in the boiler and fire, there is still a positive loss of all the caloric which is below the temperature of the water in the boiler. Mr. Sims, of the Poldice Mines, finds the air in the chimney to be 310°, whilst the water in the boiler is only 270°. It is probable that no modification could be devised, which would enable us to avail of all the caloric; but by an improvement of Capt. Samuel Grose, that is, passing the caloric from the boiler to the chimney, through tubes surrounded by water, the temperature of the water in the tube was increased from 70° to 180°. The increase of duty is estimated at one-tenth by this application, but when we look at the high temperature (310°,) at which Mr. Sims states that the air passed up the chimney, it seems probable that if all this caloric could be availed of, a much greater increase of duty would be the consequence; for the quantity of caloric wasted, being as the quantity of air passing up the chimney, multiplied by its temperature, and as the whole of the air which has circulated through the flues passes through the chimney, (though of course, considerably less expanded,) it follows that the difference between the heat evolved from the fire, and the temperature of the

* Treatise on the Steam Engine, p. 119.

water, minus the temperature of the feed water when first taken from the well, must be lost. I cannot state the exact amount of increase which might be expected from extracting the whole of the caloric from the current of air, but it will evidently be, as the heat evolved from the fire is to the temperature of the water in the boiler, so is the heat of the current, leaving the boiler, to the temperature of the feed from the well.

3d. *The expansion of steam in the cylinder, by cutting off the communication with the boiler, after the piston has made a portion of its stroke.*—This is, perhaps, the most extraordinary feature in the steam engine; and the Cornish engineers, having pursued their inquiries on this subject with great accuracy, have been enabled, mainly by the extension of the principle *within perfectly safe limits*, to obtain the enormous advantages already stated.

The merit of this invention is due to Hornblower, who, in 1781, obtained a patent for the invention. He states, that, "when steam is confined on one side of a piston, and a partial vacuum is formed on the other, the steam will move the piston, till its force be in equilibrio with the friction and uncondensed steam; and as much power as is communicated during this motion, is in addition to the ordinary effect of steam pressure." To gain power in this manner, Mr. Hornblower used two cylinders, in which the steam was to act; employing the steam after it had acted in the first cylinder, to operate a second time on the other, by permitting it to expand itself; which he did by connecting the cylinders together by proper apertures.*

Mr. Hornblower was, however, prevented from availing himself of his invention by Messrs. Boulton & Watt's monopoly for the improved mode of condensation being unexpired; and Mr. Watt, in the following year, obtained a patent for expanding his steam in one cylinder. Neither Hornblower nor Watt seemed to have intended to use high steam, and the advantages were, therefore, limited to the effect obtained by steam a little exceeding atmospheric pressure, being expanded until its effort was unable to overcome the friction of the machinery, and the resistance of the uncondensed vapour in the cylinder.

[TO BE CONTINUED.]

Some observations upon the Organ, with a plan for an improved management of the Swell, by means of a Movable Key Board.

By Dr. Hodges.

The parts of which a first rate organ usually consists are four,—the great organ, the swell, the choir organ, and the (German) pedals. Of these, the second (the swell) was, up to a recent period, if it do not still continue to be, almost peculiar to this country; whilst pedals, and the art of pedal playing, were, until within these few years, comparatively as little known or studied amongst us, as the swell was upon the continent.

Pedals were of German origin, the swell was an English inven-

* Repertory of Arts, vol. iv. p. 396--1796.

tion, and each still retains its nationality. Hence, probably, might be traced some of the distinctive differences of national style and musical taste, but this would not be appropriate matter for the Repertory.* Dr. Burney says of the swell, that "it is so capable of expression and pleasing effects, that it may well be called the greatest and most important improvement that ever was made upon any keyed instrument;" a proposition which is somewhat too sweeping in its nature, seeing that the pedals long previously had added fully as much of majestic grandeur, and the extended capability of all the imposing effects of divided harmonies, in the one direction, as the swell contributed of grace, beauty, and delicacy, in the other. No organ can be deemed complete unless it possess both.

The swell has hitherto been managed by the medium of a lever pedal, placed beneath, and on the right side of, the manuals, or finger keys. This, then, when in action, exclusively usurps the *right foot;* whilst, on the other hand, pedal playing demands the active co-operation of *both the feet.* Hence a difficulty, which it is the object of the present essay to remove.

The desideratum, then, is to find a mode of giving to the performer the perfect control of the shutters, or blinds, of the swell-box, still leaving both his feet at liberty: and this has become the more necessary in this western part of the kingdom, since I introduced the mode of dispensing with a fourth part of the instrument, by planting the whole of the great organ in a capacious swell-box, thereby altogether doing away with the use of the ordinary swell-keys, pipes, and movements, and diminishing in no small degree both the cost and the size of the instrument, whilst its general effectiveness is certainly rather augmented than lessened. The swell-box, in this case, is constructed upon the principles laid down in the Quarterly Musical Magazine and Review, vol. viii. p. 395, (a work now, unhappily for musical science, defunct,) and is susceptible of a much greater crescendo and diminuendo than those who are conversant only with the swells of the London builders can have ever witnessed. But to the point, viz. the management of the swell without the intervention of the right foot.

As when engaged at this instrument, both of the hands, both of the feet, the eyes, and the ears of an organist are simultaneously put in requisition, there would seem to be but little chance of employing any other part of him in the same service, unless the *trunk* could be rendered available. And accordingly in this direction I did look, in hope of finding a method of commanding the swell by the aid of the *back:* but it was quickly evident that a freedom of motion in the body is essential to the proper management of the keys, but more especially to that of the pedals. Subsequently, the idea occurred to me of making the *key-frame* perform the office of the usual pedal, or lever, of the swell, in a manner now to be described.

The proposition may, at first, be startling; but certain it is, that it

* We take this opportunity of stating, that any subject that depends upon mechanical aid for its result, is in keeping with the object of this work.—Ed.

is perfectly practicable to render the key-board capable of swinging upon an axis, or a couple of pivots, during the time of performance, without, in any degree, impairing, or impeding, the action of the movements. It will be necessary only carefully to attend to one point, viz. that the axis or centre of motion of the key-frame or board shall exactly correspond with the line at the termination of the back part of the keys, whence the key-motion is to be transmitted to the pallets, whilst the motion of the board, or frame, to which the keys are attached, shall be communicated to the swell-blinds, or shutters. Such an arrangement being made, any pressure upon the keys beyond that which is necessary to open the pallets, will depress the key-board itself, and so open the swell box. A slight sketch will make the matter more perfectly intelligible.

Fig. 1.

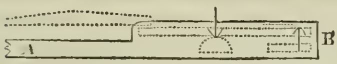
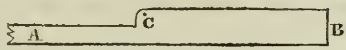


Fig. 2.



Let A B C, figs. 1 and 2, represent the proposed key-board frame, the front of which, B, is capable of depression by the action of the hands upon the keys, and of subsequent elevation by the springs or weights attached to the swell shutters of whatever description. In fig. 1, a section of the keys and of the back-falls to carry off the key motion to the valves, or pallets, is exhibited by dotted lines. In fig. 2, the key-frame only is represented, in order more clearly to point out the position (*c*) of the pivots (one upon each side or end,) upon which it is to move, and which must be precisely *in the line of the bearing of the back-falls upon the termination of the keys.* Being in that relative position, it is evident that the moderate elevation or depression of the key-frame will make so slight a difference in the action of the keys upon the pallets, as to be totally imperceptible. The extent of the motion allowed to the key-frame, of course must not be considerable. Three or four inches will be found quite enough. When at *rest*, the keys should slope a little backwards; by which means, during the average of *performance*, they will probably be pretty nearly horizontal. The frame is continued towards A, to convey the motion imparted to it by the extra pressure of the fingers, beyond that which suffices to put down the keys, to the swell-shades, or blinds, in the same manner as is now effected by the action of the swell-pedal.

I am well aware that it would be utterly impossible for any mortal finger to command the action of some of our old rumbling swell-sliding-shutters of half a hundred weight, or more: but truly there is no need of any such ponderous apparatus, as I have found that *three sets* of Venetian shades, or blinds, of about a quarter of an inch in thickness, covered on each side with thin milled-board, (very thick paper,*) still worked so easily as to require the addition of a very powerful spring, or heavy weight, before sufficient resistance was obtained to balance the foot, prior to which a single finger sufficed to

* An excellent non-conductor of sound.

depress the pedal. Of course it will not be necessary to obtain that resistance upon the present plan, but merely to furnish a spring having just power enough to close the swell-box, and to restore the keys to their proper position.

Neither does this scheme militate against the retention of the swell-pedal now in use. It may still be retained for occasional employment, and a hundred methods may be devised of fixing the swell-key-frame in one immovable position for any occasional temporary purpose.

The peculiar advantage derivable from the plan now proposed, is not confined to the liberation of the right foot for the service of the pedals, although that alone is of material importance,—but points at another result which cannot but contribute in no small degree to increase the effectiveness of the swell itself. Upon the old plan, the concurrence of the combined action of the hand and the foot is necessary; the finger puts down the note, the foot imparts to it its character, and both do not always "pull together:" upon the present, the same hand which puts down the key, will have to convey the impress of "expression" also, and this will follow very naturally, and without the imposition of any new difficulty. Whether, from the universal prevalence of the piano-forte, or from any more remote and innate cause, it is so habitual to every performer upon a keyed instrument, to increase the pressure of his fingers whenever he requires increased force in the effect of his performance, the one is so closely connected with the other, that when he has once overcome the transient embarrassment which may probably arise from the unwonted instability of the key-board, I doubt not but that he will experience a sensible relief from the present cumbrous mechanism, in the simplicity and unity of action gained by the plan now proposed, and that he will feel as grateful for the liberation of his dexter leg, as though he had received the *gratuity of an additional limb.*

Cloisters, Bristol, May 16, 1833. E. H.

[*Rep. Pat. Inv.*

On the application of Caoutchouc to different manufactures, and particularly to Elastic Web.

From a paper read at the Royal Institution by Mr. Brockedon.

The lecturer stated, that although his object was to explain the application of caoutchouc to elastic fabrics, yet, perhaps, it would be interesting to give a short account of the early knowledge of the material in this country; for although it has been known here about 100 years, yet very little of its useful properties were discovered till within the last ten or fifteen years, when Mr. Hancock took out his patent for applying it in its elastic character, and used it as springs for gloves, and a variety of other articles, by sewing threads of the elastic gum between two surfaces, as described in his specification. A patent was also taken out in the name of Mackintosh, for placing

a thin layer of caoutchouc between two thicknesses of cloth, and thus rendering the same water proof, since which other patents have been taken out with reference to this subject.

From the first knowledge in Europe of the source of caoutchouc, and the means of its production, we appear to have been indebted to some French academicians who were sent out for the purpose of astronomical observations in 1735; they discovered that it was a white milky juice of certain plants, found abundantly in Para in the Brazils, in Quito, and since found in Asia, and several other places—a specimen of one of the trees was on the table—they grow so extensively in some places, that hundreds of miles are covered with them; thus there is no fear of the material falling short of the demand. One of the first purposes to which caoutchouc was applied, appears to have been the well known property of rubbing out black-lead pencil marks, and hence probably originated the name, of India rubber, by which it is now better known in this country.

The lecturer here read the following note from the London and Edinburgh Philosophical Magazine for January, 1833:—

"Few persons are perhaps aware of the comparatively late introduction of India rubber into this country. The following notice is appended by Dr. Priestly to the preface to his 'Familiar Introduction to the Theory and Practice of Perspective,' printed in 1770; but it will be observed that no name is given to the substance described: 'Since this work was printed off, I have seen a substance excellently adapted to the purpose of wiping from paper the marks of a black-lead pencil. It must, therefore, be of singular use to those who practice drawing. It is sold by Mr. Nairne, mathematical instrument maker, opposite the Royal Exchange. He sells a cubical piece, of about half an inch, for three shillings; and he says it will last several years.' "

Most persons have seen the various forms in which caoutchouc is imported into this country, that is, either in large hard cakes, or in the form of bottles, which last, it is possible, were originally made by the natives for the purpose of holding liquids; they formed these bottles by making a mould of clay, and then permitting the white milky juice to run all over its surface till there was a thin layer or coat; in this state it was held over a fire to dry, and hence its black colour, from the smoke: when dry, it is covered with another coat of the juice, which was also dried, and so on till sufficient thickness was obtained. The clay was then removed from the inside by breaking it into fine powder, and permitting it to pass out of the neck of the bottle.

It being known that the original condition of the caoutchouc was the fluid state, solvents were sought and found. These are various—the essential oil of coal tar, the oil of sassafras, the essential oil of turpentine, and some others. It is also soluble in fat oils, particularly in those of almonds and olives. Professor Mitchell says, that the most perfect of the solvents is the oil of sassafras, as it evaporates entirely, and the caoutchouc recovers all its qualities, whilst all the other solvents cause a greater or less change in its quality. The lec-

turer then showed and explained a great variety of fabrics which were on the table, in which there was one principle pervading the whole, that is, the warp, or longitudinal threads, were of caoutchouc, and the weft, or cross threads, of cotton, silk, or linen, according to the object of the fabric. There was also a machine for making elastic braid, by covering a thread of caoutchouc with silk or other threads. The lecturer then explained, that the threads of caoutchouc were produced by cutting it, by means of a machine, with the greatest evenness and equality. One pound will make a thread (known in the trade as No. 5,) eight thousand yards in length, which was the average thickness of the thread used; but this thread, by the machine, might be again cut longitudinally into four, making in the whole thirty-two thousand yards from one pound of caoutchouc; and such is the facility obtained by the machinery, that two girls are capable of cutting thirty pounds per day, producing 240,000 yards of No. 5 thread. In working threads of caoutchouc it will be found that if they are kept stretched for any length of time, and are exposed to cold, they become set to the length to which they have been stretched, and will no longer have elasticity; but by the application of heat, the threads will return to their original length, and become again elastic; consequently in weaving fabrics with warp threads of caoutchouc, produced as before stated, the fabrics, when first woven, are not elastic, nor can they be extended to a greater length; and in order to obtain elasticity in such fabrics, a hot iron is passed over them, by which means the warp threads of caoutchouc shrink back to their original length, and then become elastic. In some instances where the elastic fabric would be liable to be extended beyond the ultimate power of the elasticity of the caoutchouc, in place of having all the warp threads of the elastic gum, alternate threads of cotton, silk, or linen, are placed in the loom; by this means the fabric cannot be stretched beyond the ultimate power of the elastic elongation of the caoutchouc, as the strain would then come on the warp threads of cotton, silk, or linen, and prevent the fabric being further stretched.

The lecturer spoke of the powers of distension of caoutchouc in reference to the blowing out bottles into balls and balloons, and mentioned some instances where a piece of the size of a walnut had been distended to the extent of fifty inches in diameter; the means were to boil the material for an hour or two, and then to expand it by blowing. Within a few years the material sold for five and six shillings the pound, now any quantity may be had at a quarter that cost, even with the increased demand. The lecturer then mentioned a liquid which had been discovered by Messrs. Cornish & Co., but the nature of which was a secret, by which caoutchouc which is rotten, and has lost its elasticity, may be perfectly recovered in a few minutes. Mr. Brockedon concluded his very interesting and instructive lecture by stating, that the application of the material on which he had been treating, was but in its infancy, although great strides had been made within a few years; Messrs. Cornish & Co., Mr. Sevier, Mr. Hancock, and some others to whom he had been indebted for information,

were still going to great expense in a variety of new applications which he was not at liberty at present to mention. [*Ibid.*

¶ *Report of Messrs. Walker and Burges, Civil Engineers, on the state of Blackfriars Bridge.*

Since the worthy citizens of London have been reckoning up what it has cost them to build their new bridge and take down the old one, and contrasting the immensity of the expenditure with the insignificant amount of positive good which they have derived from it, an opinion is, with good reason, gaining ground among them, that they have paid excessively dear for their whistle. Two millions is, certainly, an enormous sum, in times of national distress especially, to lavish on a mere matter of taste; for, after all the outcry that was raised against the old bridge, on account of the injury it was *said* to cause to the navigation of the river, every one is now at a loss to discover what the navigation has gained by its removal, while for every purpose of land traffic the old bridge was nearly as good as the new—being equally straight, almost as wide, quite as strong, and inferior principally in architectural elegance. The whole affair in truth was a prodigious job, and prodigiously the children of Gog and Magog have paid for it. The good citizens are even denied the consolation of thinking that they have seen the end of their folly, for to the two millions already expended, many thousands, if not millions more, must yet be added, to defray the expense of various necessary changes consequent upon the change of the old bridge for the new. A sum of £90,000 is now required to save Blackfriars bridge from the total ruin with which it is threatened, chiefly through the alteration caused in the general state of the river, by the removal of the dam at Old London Bridge. The measures taken to protect Westminster Bridge from a like catastrophe cannot have cost much less. And there is, probably, not a single proprietor on either side of the river, above the site of Old London Bridge, who will not, sooner or later, be obliged to adopt similar defensive measures for the protection of his premises. Neither can any one of the gulled multitude claim the saving benefit of a "Who would have thought it?" For there is not a single circumstance in this long train of loss and damage, which was not distinctly predicted by the most eminent men of science of the age, *before* the edict passed for the destruction of the old bridge. Every thing is happening precisely as Mr. Smeaton, Mr. Telford, Dr. Gregory, and others, foretold, and as we did our best, about two years ago, to remind the public would assuredly happen, unless averted by such remedial measures as were still, at the eleventh hour, capable of being carried into effect.

On the 27th of September last, (that is, not till more than a whole year after the opening of the new London Bridge had elapsed,) the Court of Common Council appointed a committee to take the necessary measures to ascertain the effects which the change in the river had made on the condition of Blackfriars Bridge, and how they might

best be remedied. Messrs. Walker and Burges, civil engineers, were selected by this committee to make a survey of the bridge, and an estimate of the necessary repairs; and on the 25th of April last, the report of these gentlemen was laid before the Common Council. We have now a copy of this report before us, and as it contains matter of great interest to the public at large, as well as to the engineer profession, we shall transfer it, with but little abridgment, to our pages.

Report.

Our first object was the survey of the bridge, and for that purpose we naturally expected to be furnished with some plans, or other information as to its construction. In this, we have been disappointed. Although the bridge was built under the direction of the city of London, there do not appear to be any plans or documents in the possession of the corporation, that give the smallest assistance in any of the objects of our inquiry.

* * * *

As the common diving bell appeared to us from its size to be inconvenient for examining the foundation, without a large excavation near the piers, which it was desirable to avoid, and from its not affording the opportunity of examining the vertical face of the stone work, we applied to Mr. Barnard, the member of Parliament for Greenwich, who has an interest in Deane's patent diving helmet, for the use of that machine. Mr. Deane brought it from Portsmouth, and has attended us during the survey, having, as well as ourselves, frequently descended to the foundations, and examined the work by means of it.

Timber and stone of foundations.—The first particular object of our survey was the condition of the timber and stone work of the foundations of the piers. For this purpose excavations were made by dredging down quite to, and under, the level of the caisson bottoms; and the condition, as well as the levels, of the timbers, of which we took several specimens, were ascertained beyond doubt by the diving helmet. In cases where digging and examination by the diving helmet were thought unnecessary, boring was resorted to, and we are enabled to say that the timber which forms the foundation of the piers, is in a sound and perfect state. The specimens, when first cut, appeared as bright and fresh coloured as new timber.

Every part of the bridge, so far as we have ascertained, is built of Portland stone, which is of a soft calcareous nature, and subject to decay from exposure to the weather; but we can, from our surveys, state with some confidence that all the stone work, from the foundation up to low water mark, is as good as the day it was laid, the mortar entire in the joints, and the tool marks remaining on the faces of the stones.

Levels of piers.—Our report of the levels of piers, both as respects the different points of the same pier, and comparing them with each other, is also favourable. We have attached to this report a list of the comparative levels, to which we beg to refer: it will be seen that the greatest inequality in the level of any one pier, does not exceed four

and a half inches, and that the greatest variation in any two points of different piers, is not more than six inches. Supposing even that all the points referred to were originally quite level, which with caissons it is very difficult to accomplish, the work has settled very little, and there would be nothing to apprehend on this score if the state of the river had continued the same as when the bridge was built, or as it was previously to the removal of the London Bridge, or probably, with little exception, even in its present state.

General state of bridge.—As respects, therefore, the state of the bridge itself, it may be safely affirmed that up to low water mark it is perfect, and that the imperfections of the stone work begin from that level. The repairs which are required above it are fully described in the accompanying specification, to which we beg to refer, and shall here only state the principal features, and our reasons for recommending works to the extent we have specified.

Piers and abutments.—From the level of low water, before the removal of London Bridge, to nearly the high water mark, the whole of the stone work forming the front of the piers and abutments, is in so very dilapidated a condition as to make new facing with better stone, the only prudent and safe plan of repair. The ends, or cut-waters, of the piers being more exposed to blows from barges and ice, are still more damaged, and so shaken as to render renewal from the footings absolutely necessary.

Levels of tides and facings required.—Previously to the removal of London Bridge, the low water mark was seldom under the top of the offset courses of the piers, and in the great proportion of tides still higher, so as to protect the first course above the footings, which is in a much better condition than those above it. The result of the removal of the old bridge has already been to reduce the level of low water about twenty-two inches at Blackfriars Bridge, and as this effect will increase as the remainder of the piers of London Bridge are cleared away, we have no hesitation in recommending that the new facing should commence from the offsets,* and be carried one course, or about two feet three inches, on the average, above high water of ordinary spring tides. *Extreme* tides are three feet above the level of ordinary spring tides, but as such tides occur seldom, their action on the stone is not to be feared. We consider that the effect on the high water above London Bridge, by the removal of the old structure, is already produced to nearly its full extent, which we never considered would be more than raising the level above one foot, as stated in Messrs. Walker and Leach's Report to the Navigation Committee in 1821, being the amount to which the old bridge acted as an obstruction to the free flow of the tide, or the difference between the level of high water on the two sides of the bridge. The level proposed for terminating the new facing we therefore think ample: the whole height of new work will be eighteen feet and three inches, which will extend round all the piers, and in addition to this, the quoins of the arches

* This is supposing the repairs to be done without the coffre-dams hereafter referred to.

will be renewed five feet higher. We propose the cutwaters and shoulders of the piers, and the quoins, or facing arch stones, to be of granite, the other parts to be of Bramleyfall, or some other equally durable stone.

Columns.—From the very dilapidated state of the cutwaters of the piers, the columns which rest upon them are endangered, particularly towards their bases, by which the high tides have reached and decayed the stone: some of them have besides been struck by barges which have displaced the lower stones of the shafts, so that these columns are really dangerous. A heavy blow on the disturbed stones might be the means of throwing down the column altogether, and the recess over it would follow; the consequences of this might be very serious, both with reference to the lives of the persons in the barge, and of those in the recess at the time, who would probably be precipitated with the falling columns into the river.

[TO BE CONTINUED.]

Preservation of substances by means of alkalies.

M. Payen has preserved during many months polished instruments of iron and steel, by keeping them in solutions of potash and soda—saturated solutions, diluted with one, two, or three times their weight in water. He at first thought that the preserving power depended upon the disappearance of the air and carbonic acid in the alkaline mixture, but he afterwards concluded that alkalinity acted an essential part in the phenomenon. In fact, a very small quantity of alkali is sufficient: thus $\frac{2}{1000}$, and even $\frac{3}{1000}$ of caustic potash in water, will preserve from oxidation bars of iron, &c. immersed in it. Lime-water, diluted with its own weight of water, or, of course, without dilution, answers the same purpose. Alkaline carbonates and borax have the same effect, but they must necessarily be stronger.

[*New Edinburgh Philos. Jour.*

¶ *Composition of the Silver Bell at Rouen.*

M. Girardin, professor of Chemistry, has, by a careful analysis, ascertained that it does not contain any silver. One hundred parts by weight contain—

Coppper . . .	71
Brass . . .	26
Zinc . . .	1.80
Iron . . .	1.20
	100

Modern French bells differ but little from the above, being composed of—

Copper . . .	78
Brass	22
	100

Thus, the popular opinion which has long existed, that the old church bells contained a smaller or larger portion of silver, is destroyed by the efforts of science. [*Rep. Pat. Inv.*

¶ *Immersion of Conical Bodies.*

An interresting experiment was put in practice in this dockyard, (Devonport,) a short time since, to prove the fallacy of the naval doctrine, that a floating body, conically shaped, may be more easily immersed with the apex upwards than if it were reversed. A new buoy, accurately shaped, which your readers know is formed like two hollow cones united at their base, was carefully marked round the centre and loaded with iron until it sunk to the middle; it was then taken up and weighed against as much more iron as would exactly balance it, and on being put again into the water, it appeared that the whole of the iron weighed against it was required to immerse the other half of the buoy, which then floated with its top just under the water's edge; thus proving that precisely the same weight was necessary to immerse the upper part of the buoy or cone, with its apex uppermost, as that required to sink the lower half or cone in the inverted position. [*United Service Journal.*

Portable Milk.

M. Dorchoff, the Russian chemist, who sometime since discovered the process of making starch into sugar, has lately made several experiments upon milk; the result of which he has arrived at is curious. He is said to have found a mode of keeping milk for use for any definite space of time. The process of preserving is this,—he causes new milk to be evaporated over a slow fire, until it is reduced to powder. This powder is then put into a bottle, which is hermetically sealed. When the milk is wanted for use, it is only to dissolve some of the powder in a suitable quantity of water, and the mixture so dissolved will have all the qualities, as well as the taste of milk. [*Ed. Agri. Jour. & New Ed. Philos. Jour.*

¶ *Stucco for Walls.*

In Italy great use is made of a stucco which gives to the walls the brilliancy, the cleanliness, and almost the hardness, of marble. It may be variously coloured, to suit the taste of the employer. This stucco is made very easily, by mixing lime and pulverized marble, in nearly equal proportions, according to the meagreness or richness of the marble. A paste, or mortar, is made of this mixture, and applied to the wall in the thickness of a five franc piece, with a trowel wet with soap suds, and in such a way that the whole of the wall may be finished in the same day. None but mineral colours should be mixed with the stucco, as the lime would destroy those derived from the vegetable kingdom. To obtain the greatest brilliancy, the mor-

tar should be applied with a cold trowel. Workmen, for the sake of ease and expedition, usually employ it warm. Chips and fragments of marble may be advantageously employed for this purpose. In cases where the appearance of a marble wall would be objectionable on account of its coldness, any portion of it may be covered with paper. [*New Ed. Philos. Jour.*

Meteorological Observations for August, 1833.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Dew point	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches				Inches.	
	1	56°	76°	29.90	29.90	47°	W.	Moderate.		Clear day.
	2	68	83	.85	.85	55	W.	do.		Lightly cloudy—clear.
	3	65	83	.85	.90	63	W.	do.		Clear day.
	4	68	83	.85	.85	65	S.	do.		Foggy—flying clouds.
	5	68	84	.83	.83	66	SE.	do.		Fog—cloudy—rain.
	6	71	78	.83	.85	73	E.	do.	0.40	Cloudy—showery.
	7	70	80	.80	.80	73	W.	do.		Flying clouds—cloudy.
☽	8	64	80	.90	.90	65	W.	do.		Clear day.
	9	68	74	.80	.80	52	SW. W.	Brisk.	0.25	Showers—clear.
	10	53	72	.90	.90	52	NW.	Moderate.		Clear day.
	11	56	74	30.00	.90	53	SW.	do.		Clear day.
	12	66	79	29.80	.80	64	S.	Brisk.		Clear—cloudy.
	13	72	84	.60	.60	58	SW.	do.		Cloudy—flying clouds.
	14	64	80	.70	.70	60	W.	Moderate.		Clear day.
⊗	15	64	82	.70	.70	63	W.	do.	0.62	Clear—shower.
	16	64	79	.75	.80	68	W. S.	do.	1.29	Cloudy—heavy shower.
	17	64	76	.90	.90	57	W.	Brisk.		Cloudy—clear.
	18	59	74	.90	.90	53	W.	do.		Clear day.
	19	54	77	.95	30.00	44	W.	do.		Clear day.
	20	56	79	30.00	.00	56	W.	Moderate.		Clear day.
	21	57	74	.00	.00	56	W.	do.		Lightly cloudy—clear.
☾	22	64	76	29.90	29.86	66	NE.	do.		Clear day.
	23	68	74	.80	.80	63	E.	do.		Cloudy day.
	24	64	72	30.00	30.00	50	E.	do.		Clear day.
	25	58	76	.05	.00	58	W.	do.		Clear day.
	26	58	84	29.80	29.60	62	W.	do.		Cloudy—clear.
	27	62	69	.65	.70	57	W.	Brisk.		Clear day.
	28	50	64	.80	.80	45	W.	do.		Clear day.
	29	49	68	30.00	30.05	43	W.	Moderate.		Clear day.
☺	30	59	73	.00	29.90	47	W.	do.		Lightly cloudy—clear.
	31	60	76	.00	30.00	60	W.	do.		Clear day.
	Mean	61.90	76.87	29.86	29.68	58.5			2.56	

	Thermometer.	Barometer.
Maximum height during the month,	84. on 5th, 13th, 26th.	30.05 on 25th, 29th.
Minimum do. . .	49. on 29th.	29.60 on 13th, 26th.
Mean do. . .	69.38 .	29.87

JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

NOVEMBER, 1833.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Proposed methods for facilitating the Extraction of Oil from Cotton Seed.

TO THE COMMITTEE ON PUBLICATIONS.

The usefulness of oil in supplying many of the wants of society, the great demand for it, and its general consumption, have given to it an importance that has commanded the attention of the statesmen, agriculturists, and merchants, of most nations; and we perceive that all their exertions have brought into market a quantity short of the demand, and that the consumption would be greatly extended if the supply were increased.

It is one of those articles, the procuring of which from fish and from seeds, has called into action the labours of sailors and agriculturists in the United States; principally that of the former. The labour, enterprise, and capital employed in getting oil, in the South Atlantic and Pacific Oceans, are wonderful. It is somewhat surprising, that neither the profit nor the character, gained by our fishermen, has as yet excited the enterprise of any *class* of our agriculturists, farmers, gardeners, or planters, but so it is; for if we except linseed, there is little or no oil made from the agricultural products of the United States. The objects of the Franklin Institute are to develope the resources of our country; to throw all the light, possible, on the processes of industry, and to make the bringing of the products into market as simple as the nature of the case will admit; to cultivate whatever is cal-

culated to make a demand for labour, and the employment of all, according to their respective capacities and means, to the end that there should be none who shall not be in the enjoyment of the necessaries and comforts of life. I shall, in furtherance of this object, present the readers of the Journal with some new processes for extending the production of vegetable oil, and which I am convinced are feasible, and founded on correct principles, and when carefully carried into practice will be followed with success.

It is proper to mention, for the encouragement of the American agriculturist, that in France, in her southern provinces, they make large quantities of olive oil, and out of the refuse or grosser parts, a useful soap, known in commerce by the name "Castile Soap." It is an article of very extensive consumption, and a substitute for it may be found in some of the vegetable soaps that will be made here. In the north, an excellent oil for the table is made from the seed of the white poppy; this is so good, that when only five or six weeks of age from the time it has been expressed from the seed, it is difficult to distinguish it from the olive; and through most parts of France and England, very great quantities of oil are made from the seeds of colchicum, a plant known in Britain by the name of "Rape seed." This oil is used in burning, and is employed in many manufacturing processes. There is every reason to believe, that the soil and climate of the greater part of the United States, and certainly that of Kentucky, Indiana, Illinois, Tennessee, &c. would prove more congenial to colchicum than that of either England or France.

My purpose, however, is not to write a treatise on the plants that produce seed which yield oil, or on their cultivation, but to give some new processes for making oil out of the seeds when grown; and as we have cotton seed in great abundance, and but little use is made of it, I shall take it for the material to be considered in this essay.

The quantity of oil in cotton seed is considerable, but the procuring of it has hitherto been so much impeded by the fuzzy cotton which adheres to the shell, or bran, that no progress has been made in this as a branch of business. My object is to suggest means to avoid the difficulties that attend the flaxseed process of bruising and pressing, and to get as much, and purer, oil. I have heard that it has been proposed to get rid of the cotton fibres, which adhere to the seed, by burning; but am not informed how far the plan has been successful.

Two plans for making cotton seed oil present themselves, the one by mechanical means, the other by chemical process—and I shall begin with the former.

Let the cotton seed be subjected to the same process which is employed to make what in this country is called "Pearl Barley," and in England, Ireland, and Scotland, is termed "Pot Barley." The mill, or machine, that converts the grain barley into pearl barley, is very simple, and consists of a large grindstone enveloped in a case of sheet iron that is larger than the stone, by some three or four inches, at all places, and this case is perforated with many holes, made with

the point of a punch, driven from the outside, so that the inside of this case forms a species of grater. The grindstone, in the act of working, turns very fast, while the enveloping case moves slowly. The former scours off all the shell, while the motion of the latter turns over and mixes all the grains, and brings every one of them in contact with the grindstone. The process is continued until the workman judges that his grist is sufficiently skinned, when he stops his mill, draws out a slide door, and examines it, and if it has arrived at the proper state, he turns the iron case round, so as to bring the slide door down, and the contents are received into a box; the case is immediately refilled and again put in action. The grist taken out is put into the hopper of a wind fan, and all the shells and dust blown away from the kernel of the grain. which is now converted into "Pot Barley." It is proposed to treat cotton seed precisely in the same way, and when it is fanned, to bruise the seed, and then press it exactly as in the case of flax seed. This part of the business must prove even more easy and productive than with flax seed, because the cotton will be the cleaner of the two.

There are in all processes many minutiæ, great attention to which is requisite for bringing out the best results. These, the workman will discover in the course of his business. He will learn how much seed, put into the case, answers best, (for it must not be entirely full,) and the degree of heat that makes the oil press out to most advantage.

I shall now proceed to give the chemical process. The seed should be as well freed from cotton fibres and foreign matter as possible; then be thoroughly bruised and well boiled in ley, made of potash; or soda, when the object is to produce a hard soap, as potash will give only that which is soft. When oil is wanted, let the boiled mass cool to the temperature that experience shows answers best. Then pour in some sulphuric acid; this acid and potash having a strong affinity for each other, the potash will leave the oily matter it was combined with, and which it held in the state of soap,* and the union that takes place between the sulphuric acid and the potash, will leave the oil free; the liberated oil will ascend to the top, and may then be skimmed off, or some contrivance may be made for allowing it to run off, into a vessel proper for its reception. This process is practised in some branches of manufactures. In making buff leather, after the oil has produced the desired effect on the hides, it is extracted by the agency of potash, and the oil is recovered from the water, in which it exists in a soapy state, by putting sulphuric acid into the water; a union takes place between the potash and sulphuric acid, and the oil rises to the top. Sulphuric acid, since it has been made in the United States, has so fallen in price, that the objection of cost is so far removed. The high price of soda may prove to be an obstacle to making hard soap out of vegetable matter, by this process; but that obstacle will be removed when the making of soda in this

* The very respectable author of this essay seems to us to have overlooked the complex nature of the results produced by the action of alkalies upon the oils. COM. PUB.

country shall have become a business; for then, as with all other things, the price will come down.

When we consider the millions which this oil trade may be made to yield, it insures to the cotton planter the long enjoyment of his present prosperity, even after the increase of its production in this and other countries shall have brought the production of cotton up to its consumption. This must show to those interested, the vast importance of having these processes carefully put into operation, far outweighing the effect of a little more or less import duty; at one and the same time, promoting their individual wealth, comfort and tranquillity, and making the state a richer, more useful, and respectable member of a union essential to the happiness of all.

TH. PRSDNT.

Philadelphia, September 14th, 1833.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Meteorological Remarks.—Aurora.—Theory of Water Spouts. By JAMES P. ESPY.

In one of my preceding essays on meteorology I mentioned an observation made during the summer of 1831, namely, that the highest clouds moved constantly, for upwards of fifty days, from the west and south-west. This occurred every day on which these clouds were visible; on one or two days of the time there were no clouds, and on one or two others, the lower clouds could not be penetrated by the sight.

During this period the lowest current of air, and also a middle current which frequently differed from both, changed again and again to every point of the compass.

Since that period I have had much reason, from constant observation, to believe that the uppermost current of air in which clouds form, never deviates much from a south-westerly direction. Nor is it very difficult to assign a cause for this.

If we assume the mean temperature of the air at the tropic of Cancer to be eighty degrees higher than the mean temperature of the air at the Arctic Circle, which, according to the latest observations on temperature, is not far from the truth, and if we allow that the air at the tropic is expanded $\frac{1}{480}$th part, for every degree of Fahrenheit, of the volume it would occupy at the arctic temperature, (which is too small an allowance, because the arctic temperature is below thirty-two degrees,) then will the surface of the tropical atmosphere stand higher by one-sixth of the whole height than the surface of the arctic atmosphere, otherwise there would not be an equilibrium. Thus it appears that the surface of the atmosphere between the tropic of Cancer and the Arctic Circle, is an inclined plane eight miles high, with a base reaching across the temperate zone.

It is not very easy to calculate exactly the velocity which the air acquires in flowing down this plane, but it is easy to see that it must be considerable, and as it leaves the tropical regions with a velocity

of diurnal revolution greater than that of the climates over which it passes, it must deviate more and more from a direction due north, which would be its course if the earth did not revolve on its axis, and finally, in very high latitudes, it must take nearly an eastern direction. As this current is spread over the entire temperate zone, and all its parts move exactly in the same direction, it will not readily change its course from slight causes.

It might be thought, that when a great rain occurs over a particular region, for instance, over Pennsylvania, the great condensation of air which takes place over this state in consequence of the transformation of vapour into water, would cause a depression of the surface of its atmosphere, and thus cause a current of air to set in above from New York, New Jersey, Maryland, and Ohio, towards the rain. This is indeed precisely what would take place if there was a condensation of the atmosphere by a change of vapour into water. But instead of a condensation of the air being produced by rain, it is easy to show that the caloric given out in the condensation of the vapour into water is far more than sufficient to expand the air into the bulk occupied by both air and vapour previous to the rain.

Suppose, for example, one inch, in depth, of rain falls on Pennsylvania, which is equal in weight to one-four hundredth of the weight of the whole atmosphere. Now if vapour were of the same specific gravity as air, the atmosphere, if there were no counteracting cause, would be diminished in height as well as in weight one-four-hundredth of the whole. But as the specific gravity of vapour is only 623, air being 1000, the condensation caused by one perpendicular inch of rain, will be one-two-hundred and fiftieth of the whole, which is exactly one-fifth of a mile if the atmosphere is fifty miles high.

This is the amount of contraction on the supposition that there is no counteracting cause.

Now let us examine the amount of expansion caused by the caloric evolved by the vapour when it changes into rain. The capacity of the air for heat is only about one-fourth that of water, and as it is known that when vapour is turned to water it gives out caloric enough to heat the water 1000 degrees, or an equal weight of air 4000 degrees, it may be easily perceived by pursuing the calculation in this way, that one inch of rain will give out heat enough to impart ten degrees of heat to the whole atmosphere from the surface of the ground to the surface of the atmosphere, as far as the rain extends. If we suppose the mean temperature of the atmosphere at the time of the rain to be thirty-two degrees Fah. these ten degrees will expand the atmosphere one-forty-eighth of the whole—which is about one mile.

If, now, the one-fifth contraction, as explained above, be subtracted from the expansion, there will remain four-fifths of a mile, which is the real quantity of elevation caused in the atmosphere over a rain of one inch in depth.

This swelling up of the air over the region of rain will no doubt cause slight deflections in the upper current; for there will be a tendency outwards in all directions from the rain, in the whole region of the atmosphere above the cloud. Below the cloud, down to the very

surface of the earth, with the exception of the very borders of the shower, the air will move in all directions towards the rain with a velocity proportionate to the quantity of rain fallen, and the rapidity of the fall.

Nor is this mere theory; observation having verified it. One of the most remarkable examples of it, within my recollection, occurred on the 10th, 11th, 12th, 13th, 14th, and 15th, of May, 1833. During this whole time the wind was constantly south at Philadelphia, and I afterwards learned that it rained every one of those days in Canada. The same probably occurred in the northern parts of New York, as the Hudson rose to an unusual height. The rains are indeed the only cause of the irregularity of the winds at the surface of the earth. For so far as the equilibrium is disturbed by caloric, this cause is uniform, and would produce a constant flow of the air below towards the south-west, and above towards the north-east. Besides, there is sometimes a middle current moving in a direction different from the other two.

In making an observation as to the directions of these different currents, great care is necessary to avoid being deceived; for if the upper clouds should happen to move faster than the lower ones, they would be taken, unless the observation be carefully made, for the lower ones. And if the direction of one cloud is inferred from another cloud as an object of comparison, error will generally be the result. To ascertain which cloud is the highest, I let the clouds overlap repeatedly; and to ascertain their direction I keep my head steady, and refer their motion to some fixed object, as the top of a chimney, or the moon—and for such an observation I generally prefer clouds near the zenith, because their angular motion is much more rapid than that of clouds near the horizon.

When a middle current occurs I have frequently observed that it is in consequence of a change of air—the lower strata of air beginning to change first—whether this is always the case I am not prepared to say. Such a coincidence of circumstances appears to me very favourable to the production of an aurora borealis.

Suppose the air in motion for some days from the north towards the south, or any where near that direction, bringing with it a low dew point; suppose the air below suddenly to change round and blow from the south, or nearly so, towards the north, bringing with it a high dew point, whilst a middle current is still blowing from the north. When the upper current with its low dew point, overlaps the lowest current with its high dew point, the vapour in the lowest current shoots itself up, by its own elasticity, into the upper and colder current, and either by forming a better conductor than existed there before, permits the transmission of electricity from one current to the other, or else, by condensing in the colder current, gives out electricity. In the latter case clouds would certainly be formed, in the former, they might, or might not. This hypothesis requires the confirmation of repeated observations; I have seen but three auroras since I conceived the hypothesis, and all the phenomena observed in these were highly favourable to it.

It is now a point well established, that the aurora is in the region

of the clouds,* sometimes not a mile high, and on the night of the 17th May, 1833, the motion of the beautiful arch of light towards the south was exactly equal to the motion of the clouds in the same direction—all the heavens north of the arch being cloudy, and all south being clear.

This aurora moved south about seventy degrees in an hour and a quarter, forming a brilliant arch as it approached near the zenith, and disappeared about fifteen minutes after ten o'clock, about eleven degrees south of the brilliant star in Lyra.

Now if my hypothesis is correct, this arch was seen north of Philadelphia, at an earlier hour, and south of Philadelphia at a later hour. If any observer has taken a note of the time when the arch was formed and disappeared, either to the north or south of Philadelphia, I hope he will be induced, by these remarks, to send his observations for publication in the Journal. These hypothetical views, even if they should be found untenable, will not be without their use, if they induce observers to record their observations, noting the time of the appearance of particular phenomena. I am authorized by the committee of meteorology of the Franklin Institute, to say that such observations, and any others on kindred subjects, communicated for the Journal, will be particularly acceptable.

After dealing so much in hypothesis, I will now present to my readers what I hope they will allow to be the true rationale of a phenomenon which has never yet been correctly explained.

The Waterspout.

When a waterspout occurs it is acknowledged on all hands, and by every observer, that it is attended with a whirlwind. Now a whirlwind, by the centrifugal force of the air in circular motion, produces a rarefaction of the air within—sudden rarefaction is always attended with cold—and cold, if great enough, produces condensation of vapour—and sudden condensation of vapour in the air, is followed by rain.

If a waterspout is always rain, the explanation is already given. The water which accompanies the phenomenon is not taken up from the sea, as Dr. Franklin supposed; for it has never been discovered to be salt, and it also sometimes appears on land, therefore it undoubtedly comes downwards. The waterspout appears more frequently in the torrid zone, where the dew point is always very near the temperature of the air. Now it is known by experiment that a very slight rarefaction of the air will produce such a diminution of temperature as to cause a great condensation of vapour, when the dew point is near the temperature of the air.

As to the great quantity of vapour condensed into water during the progress of this phenomenon, more perhaps than is contained in the whole space occupied by the waterspout and whirlwind, it may be ac-

* We do not consider with our friend that this point has been satisfactorily determined—see the report on meteorology to the British Association for the Advancement of Science, by Professor Forbes, of Edinburgh.

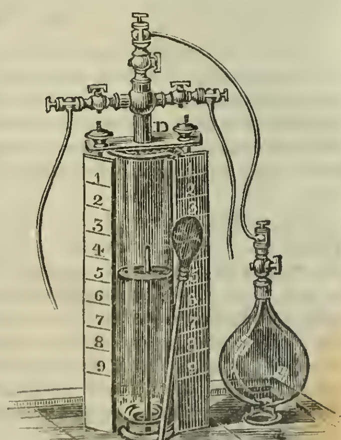
Com. Pub.

counted for by this consideration—that as soon as the vapour begins to condense by the rarefaction and refrigeration of the air, the rarefaction of the vapour is greater than the rarefaction of the air caused by centrifugal force alone; and therefore the vapouric atmosphere will press itself through the whirlwind into the greater vacuum of vapour, and thus the supply will be constantly kept up. Besides, during the progress of the whirlwind, new portions of air, with its vapour, are constantly brought within its action.

I may mention here, for the sake of some who may read these remarks, and have not attended to the subject before, that it is now known to meteorologists, that aqueous vapour and air form independent atmospheres, each pressing only on particles of its own kind, and that the vapour which is in the atmosphere is not in the least degree buoyed up by the air, but supports itself by its own elasticity, becoming more rare, like the air, as the elevation increases.

Large Volumescope, for the Analysis of Atmospheric Air, by means of Nitric Oxide. By ROBERT HARE, M. D., *Professor of Chemistry in the University of Pennsylvania.*

This apparatus illustrates conspicuously the condensation which ensues when nitric oxide gas and atmospheric air, are mingled in due proportion.



The hollow glass cylinder, which constitutes the main body of the instrument, is four and a half inches in diameter, and thirty in height. It is situated over one of the three wells in my pneumatic cistern; being secured between two iron rods well fastened to the shelf below; and terminating above in screws furnished with nuts. By means of these screws, and an intervening bar of iron, a brass disk, by which the upper orifice of the cylinder is closed, is pressed upon the rim of that orifice, so as to make with it an air tight juncture. From a hole in the centre of the brass disk, a stout tube of brass proceeds, terminating in three cocks, furnished with gallows screws, so as to permit of the attachment of three flexible leaden tubes. Of these, one communicates with an air pump, another is attached to a pear shaped glass receiver, which (for want of a better name) I shall call a volumeter, as it serves

conveniently, and accurately, to measure gas into precisely equal volumes.

On each side of the cylinder, a strip of wood covered with white paper, is supported; each of which is made to receive graduating lines in the following way. The cylinder having been filled with water, the lines are so applied as to indicate the changes of level successively produced in the surface of the water within the cylinder, by the successive introduction of equal volumes of air. These graduations are so proportioned, as to render the portion of the cavity comprised within three of them equivalent in content, to one measure of the volumeter already described. In all there are nine graduations.

In operating with this instrument, I commence by exhausting the air from the cylinder, and thus causing the water of the pneumatic cistern, over which it is situated, to rise to the fifth graduation. The volumeter may be filled at the same time, if the cocks between it and the cylinder be opened. Care must be taken to close them as soon as the water reaches the apex, so as to prevent the lead tube from being obstructed by water. The volumeter should, in the next place, be filled with nitric oxide gas. The apparatus thus prepared, it is only necessary to open the cocks, between the volumeter and the cylinder, in order to cause the nitric oxide to pass from the one to the other. Copious red fumes of nitrous acid immediately appear. By means of the gum elastic bag, and recurved tube, jets of water are next to be thrown up into the mixture, by which the absorption of the fumes is promoted. When these have all been absorbed, there will appear to have been a condensation of about three volumes and a fifth, so that the water will have risen a little above the point to which it has been supposed to be raised agreeably to the premises.

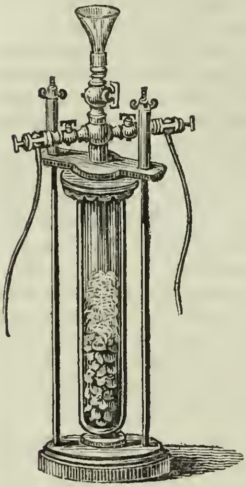
For the satisfaction of spectators, the accuracy of the graduation may be proved by allowing the contents of the volumeter in atmospheric air to pass in three times, showing that the water is thereby depressed to 3d, 6th, and 9th graduations. Also, by adding the contents of the volumeter containing three of the volumes indicated by the scale, to five previously introduced; thus, showing that the aggregate will be eight volumes, instead of less than five, as when three of nitric oxide are admitted to five of air.

Apparatus for showing the influence of Pressure on Effervescence.

By the Author of the preceding article.

A tall cylindrical receiver is supported on a wooden pedestal, between upright iron rods fastened into the pedestal, and at top cut into screws furnished with nuts. By means of these screws and nuts, and an intervening cross bar, a disk of lead, alloyed with tin to harden it, is pressed upon the rim of the receiver. The disk is so fitted to the rim of the glass, as that, with the aid of sheet gum elastic, or oiled

leather, an air tight juncture may be made. In the middle of the disk there is an aperture, from which proceeds a stout tube, with a cock on each side, severally furnished with gallows screws, by means of which, lead pipes may be made to communicate with an air pump on one side, and a condenser on the other. The tube is also surmounted by a cock into which a glass funnel has been cemented. Before closing the receiver with the disk, some carbonate of lime, or carbonate of ammonia must be introduced, so as to rise to about half the height of the receiver. I have found calcarious stalactites, like those from Weyer's cave, to be excellent for this purpose. The carbonate being introduced, and the disk fastened into its place, as represented in the figure, diluted muriatic acid may be added, by means of the funnel and cock, in quantity sufficient to cover the carbonate. Of course effervescence immediately ensues. If, under these circumstances, by means of the air pump, the atmospheric pressure within the receiver be lessened, the effervescence increases strikingly. On the other hand, if by closing the communication with the air pump, and opening that with the condenser, while this is in operation, the pressure be increased, it will be seen that the effervescence is diminished proportionably.



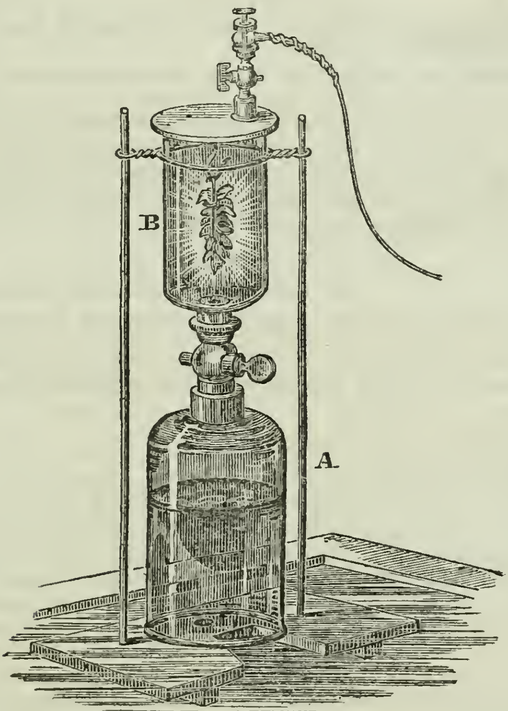
Engraving and description of an apparatus for exhibiting the combustion of Leaf Metal in Chlorine.

By the Author of the preceding article.

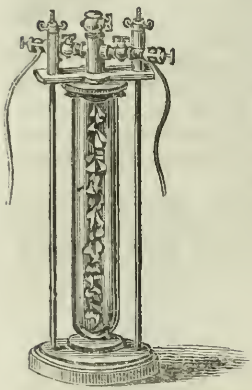
The spontaneous combustion of metallic leaves in chlorine, is but imperfectly seen when, by means of a rod, we introduce them into a vessel with a narrow mouth, replete with that gas. In passing into the vessel, the leaf carries with it atmospheric air, and first encounters the chlorine in a state of dilution. Hence a languid reaction ensues, and fumes are produced which obscure the ignition when the residual portion of the metal reaches that part of the cavity in which the chlorine is sufficiently pure to ignite them vividly. I have contrived two modes of exhibiting this combustion in all its beauty. According to one, the open necks of two bell glasses, A and B, were united, and made to communicate with each other by means of a cock. Of these, one was placed over a pneumatic cistern, and filled in the usual manner with chlorine; the other bell was, of course, in an in-

verted position, so that it might be closed by a plate of brass ground to fit upon it air tight. In this plate there is a cock communicating with a pipe, which is to be attached to an air pump when necessary. From the centre of the brass plate within the upper bell glass, B, leaves of dutch gold were suspended. By means of an air pump, this bell being exhausted, on turning the cock, by which the communication between the bells was regulated, the chlorine was instantly transferred from the lower to the upper bell, so as to surround the leaves and produce with them a most vivid combustion.

Of this apparatus, an engraving and description was published in Silliman's Journal, some years since, but as it has never appeared in the Journal of the Franklin Institute, I subjoin the figure of it here



The other mode of operating is illustrated by tne following figure, which, it will be observed, differs but little from that described in the preceding article, for showing the influence of pressure on effervescence.



The funnel being removed, into the lower orifice of the cock, which supported it, a rod is screwed fast. This rod is of such dimensions, as to extend from the top to the bottom of the receiver, and is supported within it, so as to be in its axis, or every where equidistant from the surface.

Before fastening the plate into the situation in which it is represented in the figure, it must be lifted in order to attach the leaf metal to the rod, with the aid of gum arabic. By means of one of the flexible pipes and cocks with which the apparatus is furnished, communication may be made with an air pump, and in like manner with a large vessel containing chlorine, by means of the other pipe and cock.

The preliminary arrangements being so far completed, the cylindrical receiver having been exhausted by means of the air pump, the cock regulating the communication with that instrument, is to be closed; and the other, which controls the entrance of the gas, is to be opened. By these means, the leaves burn splendidly, being simultaneously enveloped in an atmosphere of the chlorine, which rushes in to supply the vacuum caused by the air pump.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Attempt to fix the date of Dr. Franklin's observation, in relation to the North-east Storms of the Atlantic States. By A. D. Bache, *Prof. of Natural Philosophy and Chemistry in the University of Pennsylvania.*

[Substance of a verbal communication made to the Am. Philos. Soc.]

A map of Pennsylvania, New Jersey,* &c., published by Lewis Evans, which was at a late meeting deposited with the Philosophical Society, contained a memorandum to this effect; "All our great storms begin to leeward: thus a NE. storm shall be a day sooner in Virginia than Boston." As this map bears date 1749, it became a question whether the observation just recorded was prior or subsequent to the corresponding observation of Dr. Franklin, that the north-easterly storms of the Atlantic States begin to the south-west. The result of an attempt to fix the date of Dr. Franklin's observation, and which shows that it was made six years before the publication of the map by Lewis Evans, cannot be without interest to a society over which Franklin once presided.

The observation of Dr. Franklin is given in a letter to Mr. Alexander Small, dated London, May 12th, 1760. This letter seems to

* Entitled "A Map of Pennsilvania, New Jersey, New York, and the three Delaware Counties, by Lewis Evans, MDCCXLIX."

have been written in reply to some remarks in which the gentleman to whom it is addressed had shown a want of acquaintance with, or some doubts of, the fact, or to some inquiries in relation to the time at which the fact had first been noticed. Dr. Franklin was, at the date of this letter, a resident in London, as agent for the colony of Pennsylvania. The letter is as follows:

"Agreeable to your request, I send you my reasons for thinking that our north-east storms in North America, begin first, in point of time, in the south-west parts: that is to say, the air in Georgia, the farthest of our colonies to the south-west, begins to move south-westerly before the air of Carolina, which is the next colony north-eastward; the air of Carolina has the same motion before the air of Virginia, which lies still more north-eastward; and so on north-easterly through Pennsylvania, New York, New England, &c. quite to Newfoundland."

"These north-east storms are generally very violent, continue sometimes two or three days, and often do considerable damage in the harbours along the coast. They are attended with thick clouds and rain."

"What first gave me this idea was the following circumstance. About twenty years ago, a few more or less, I cannot from my memory be certain, we were to have an eclipse of the moon at Philadelphia, on a Friday evening, about nine o'clock. I intended to observe it, but was prevented by a north-east storm, which came on about seven, with thick clouds as usual, that quite obscured the whole hemisphere. Yet when the post brought us the Boston newspaper, giving an account of the effect of the same storm in those parts, I found the beginning of the eclipse had been well observed there, though Boston lies north-east of Philadelphia about 400 miles. This puzzled me, because the storm began with us so soon as to prevent any observation, and being a north-east storm, I imagined it must have begun rather sooner in places farther to the north-east than it did at Philadelphia. I therefore mentioned it in a letter to my brother who lived at Boston, and he informed me the storm did not begin with them till near eleven o'clock, so that they had a good observation of the eclipse: and when comparing all other accounts I received from the several colonies, of the time of beginning of the same storm, and since that of other storms of the same kind, I found the beginning to be always later the farther north-eastward. I have not my notes with me here in England, and cannot, from memory, say the proportion of time to distance, but I think it is about an hour to every hundred miles."

A tenacious memory for facts enabled Dr. Franklin thus to state the circumstances which had led to his observation, although the date of the year when it was made had escaped his recollection. Of the points to which he refers for fixing the date of his observation, the first seems least to be relied on, namely, that it was about twenty years before the date of his letter, that is, about the year 1740, this being the one in relation to which he expresses no confidence. The others are precise; there was to have been an eclipse of the moon on

a Friday evening about nine o'clock: the disappointment of not being able to observe this on account of the coming up of clouds, had strongly impressed upon his mind the date of the beginning of the northeasterly storm at Philadelphia. In ascertaining the date, the first to these points should, in accordance with the remarks just made, be examined with a considerable allowance for vagueness, and the second be mainly depended upon. I have, by referring to sources which are sufficiently exact, namely, the printed calendars of that day,* ascertained the times of the occurrence of lunar eclipses, visible in Philadelphia and Boston, between the years 1734 and 1748, a range of fourteen years, of which six are prior to 1740, the twentieth year before the date of Dr. Franklin's letter, and eight are subsequent to that year; the reason for extending the period, subsequent to that year, will appear from the conclusions drawn from the table.

I have preferred a reference to these calendars comprising the calculations of many persons, rather than to adopt the result of a table of eclipses such as that contained in Ferguson's Astronomy,† where the calculations of but a single individual are recorded.

Year. (Old style.)	Month.	Day of the month.	Day of the week.	Time of day.	No. of digits eclipsed.	Remarks.
1734				H. M.		None.
1735	September	20	Saturday	8 — P.M.	7	
1736	March	15	Monday	7 — ,,	12	Rises eclipsed.
,,	September	8	Wednesday	8 18 ,,	,,	
1737	August	28	Sunday	9 40 ,,	5¼	
1738						None.
1739	January	13	Saturday	4 30 ,,	6½	
1740	January	2	Wednesday	3 39 ,,	—	
,,	June	28	Saturday	2 35 ,,	12	
,,	December	21	Sunday	5 18 ,,	5.7	
1741						None.
1742	November	1	Tuesday			Before sunrise.
1743	October	21	*Friday*	8 30 ,,	12	
1744	October	10	Wednesday			Near sunrise.
1745						None.
1746	August	19	Tuesday	5 35 ,,		Rises eclipsed.
1747	February	13	*Friday*	10 27 ,,	12	
,,	August	9	Sunday	1 51 A.M.	12	
1748	February	3	Wednesday	5 46 ,,	3.2	
,,	July	28	Thursday	6 56 ,,	5.3	Rises eclipsed.

* A valuable collection of English Almanacs, which belonged to Dr. Franklin, is now in the possession of the Am. Philos. Society, of Philadelphia.

† This particular table contains only a list of those eclipses which were visible in Europe.

There are but two eclipses within the range of this table which occurred on Friday, the first in 1743, and the second in 1747; the first was seventeen years before the date of the letter of Dr. Franklin, the second but thirteen. To suppose that the observation was made on the occurrence of the former, is to allow a latitude of but three years in construing the expression "about twenty years ago:" thirteen years could not so well have been mistaken for twenty. Again, the eclipse of 1743 occurred at half past eight in the evening, or, "about nine o'clock," while that of 1747* was at half past ten at night. These circumstances would determine us to adopt the former of these dates, as that of the occurrence which led to the observation under discussion. A reference to the journals of those two years, lends additional strength to this conclusion. In the Pennsylvania Gazette, I find in November, 1743, a notice of a violent storm at Boston, on Saturday, October 22nd, and an account of the disasters caused by it in the harbour of that city, as well as along the coast further north. The following extract will be sufficient to show the nature of the remarks:

"Boston, Oct. 24th. Last Saturday we had a violent NE. storm, that brought in an exceedingly high tide," &c. &c.

"Boston, Oct. 31. We learn from Piscataqua that the late eastern storm on the 22nd inst. was as violent, and the tide as high, as in these parts."

On examining a file of the paper published in Philadelphia by Andrew Bradford, in 1747, I find no account of a north-easterly storm on the coast, on, or about, the 13th of February, although mention is made that a vessel which left Boston some time in February, encountered a storm after having been several days out at sea, and particular reference is made to certain naval operations, connected with the Spanish war, on the coast.

From a review of these circumstances, I conclude, that the observation of Franklin was suggested by, and made immediately subsequent to, the lunar eclipse of October 21st, 1743.

FRANKLIN INSTITUTE.

Monthly Conversation Meeting.

Prof. Hare showed the operation of a new double acting air pump of his invention, at once characterized by efficiency and simplicity. The pump, though double acting, has but a single barrel, the valves are opened and closed at proper times, by mechanical means, and the conversion from an exhausting into a condensing pump is effected by simply changing the connexion of the attached vessel; in fact, the pump may be made to exhaust air from one vessel, and condense it in another, at the same time. By means of this pump, air or other gases may be transferred directly from one vessel to another, being drawn from the first and forced into the second. Prof. Hare also showed an instrument for the transfer of corrosive liquids, which is figured and described in the Journal of the Franklin Institute for October.

* The years 1747 and 1748 were remarkable in Franklin's life, as he was then actively engaged in his first electrical researches.

The percussion lock of Messrs. Keith and Butterfield was exhibited by the inventor in a room adjoining the reading room, and there tried. The conditions to be fulfilled by a cannon lock, effecting the discharge by percussion powder, were discussed by the members.

Specimens of tinned cast iron, from the manufactory of Mr. Babbett, in Taunton, Mass., were placed upon the table; this new article was a desideratum; the tinned surface appeared perfect, no projecting points of iron being visible.

Two twelve inch globes, by Mr. Josiah Loring, of Boston, were submitted for examination.

Mr. Thomas Fletcher explained the operation of an instrument called a chronograph, for noting the time of any observation: the maker's name is Fatton, a pupil of the celebrated Breguet, of Paris. A pen of peculiar construction, and moved by a spring, leaves a dot of ink upon a revolving dial plate, marking the time at which the spring was touched.

Specimens of Berlin cast iron were placed upon the table by Mr. Fletcher.

A new edge-rail by Gen. W. B. Mitchell, was explained by Col. S. H. Long; the specimen rail was of cast iron, but in use it is to be of rolled iron; one of the points of recommendation was the ease with which the proposed form may be given by the roller.

Specimens of medal ruling on gold and silver, by Asa Spencer of this city, were submitted by Prof. A. D. Bache, who briefly adverted to Mr. Spencer's method of accomplishing the results under examination.

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*Appendix to the Report of the Committee of the Franklin Institute on Weights and Measures.**

Letter from the Secretary of the Commonwealth of Pennsylvania to the Managers of the Franklin Institute.

Secretary's Office, Harrisburg, May 29, 1833.

Gentlemen:—I have the honour to send you herewith a copy of a resolution of the House of Representatives of this Commonwealth, passed the 5th ult. accompanied by a printed copy of the bill therein referred to, (as I find it upon the files of the House,) with a request that you will take the same into consideration, and report thereon, to this department, previously to the meeting of the next Legislature.

This transmission has been delayed until now by reason of my unavoidable absence from the seat of government. It is hoped, however, that sufficient time remains for the full consideration of the bill, in accordance with the views of the House, as expressed in the resolution.

I am, very respectfully, your obt. servt.

S. M'KEAN.

To the Managers of the Franklin Institute
of the State of Penn. Philadelphia.

* We have deemed it adviseable to present to our readers these documents, which are necessary to a full comprehension of the report to which they are appended. Com. Pub.

Resolution accompanying the Letter of the Secretary of the Commonwealth.

In the House of Representatives, April 5th, 1833.

Resolved, That the Secretary of the Commonwealth be, and he is, hereby directed to refer bill No. 197, on the files of the House of Representatives, entitled "An act relating to weights and measures and to admeasurement," to the Managers of the Franklin Institute of the State of Pennsylvania, for the promotion of the Mechanic Arts, with a request that they would take the same into consideration, and report to the said Secretary, previous to the meeting of the next Legislature.

Extract from the Journal.

FRS. R. SHUNK, Clerk.

A Bill relating to Weights and Measures, and to Admeasurement. Reported to the House of Representatives of Pennsylvania. January 26, 1833.

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26. A hogshead of cider to be one hundred and ten gallons, in wine measure.
27. Grain may be sold by weight. Proviso.
28. Foreign salt may be sold by weight. Proviso.
29. Anthracite coal may be sold by weight or measure.

An Act relating to Weights and Measures and to Admeasurement.

Section 1. Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same, That it shall be the duty of the governor to procure for the use of the commonwealth, metallic standards for weights and measures, according to the denominations of weights and measures which have been used and approved in this commonwealth, which standards shall be enclosed in suitable cases, and deposited and carefully preserved in the office of the state treasurer.

Section 2. And be it further enacted by the authority aforesaid, That it shall also be the duty of the governor, from time to time, as he shall judge expedient, to cause the said standards to be examined and tried, and if necessary, to be corrected or renewed, so that they shall at all times be of their original measure or weight and proportions.

Section 3. And be it further enacted by the authority aforesaid, That, *Provided nevertheless*, That, if the Congress of the United States shall hereafter establish a standard for any of the denominations of weights or measures, it shall be the duty of the governor to cause the standard of this commonwealth, for the same denomination, to be made equal in all respects, and to be at all times conformable thereto.

Section 4. And be it further enacted by the authority aforesaid, That the standard yard which shall be procured by the governor, shall be taken as the unit of all measures of length, and one-third part of the said standard yard shall be a foot, and one-twelfth part of such foot shall be an inch.

Section 5. And be it further enacted by the authority aforesaid, That the yard aforesaid shall be graduated or divided by marks engraved thereon, so that it shall exhibit distinctly the following measures, to wit :

The length or rectilinear extension of the foot, and of the inch aforesaid, and all the customary divisions or aliquot parts of a foot.

Also, the length or rectilinear extension of one-half of a yard, one-quarter of a yard, one-eighth of a yard, one-sixteenth of a yard, and of all other customary divisions or aliquot parts of a yard.

Section 6. And be it further enacted by the authority aforesaid, That all measures of extension, whether binary, ternary, decimal, duodecimal, or other aliquot parts, divisions, or fractions of a yard, foot, or inch, or any multiple, or combination thereof, expressed or known, by any customary measure, or by any of the terms of admeasurement, of extension, quantity, capacity, or other dimension, shall respectively be equal to the same part, proportion, or multiple of the standard yard, foot, or inch aforesaid, and not otherwise.

Section 7. And be it further enacted by the authority aforesaid, That the standard measure of the wine gallon shall contain two hundred and thirty-one cubical inches of the standard inch aforesaid, and no more. And the standard measure of the beer gallon shall contain two hundred and eighty-two cubical inches, as aforesaid, and no more.

Section 8. And be it further enacted by the authority aforesaid, That the standard measure of the bushel shall contain two thousand one hundred and fifty cubical inches and forty-two hundredths of a cubical inch, of the standard inch aforesaid, and no more.

Section 9. And be it further enacted by the authority aforesaid, That the measure of any aliquot or fractional part of the wine gallon, beer gallon, and bushel aforesaid, shall be proportionate thereto respectively, in the ratio of such aliquot or fractional part.

Section 10. And be it further enacted by the authority aforesaid, That the bushel to be used for measuring lime, shall be made in the form, and of the dimensions following, to wit: thirteen inches and a half diameter at the bottom

in the clear, fifteen inches diameter at the top in the clear, and thirteen inches and forty-seven hundredths of an inch perpendicular depth in the clear.

SECTION 11. And be it further enacted by the authority aforesaid, That the denomination of weights shall be computed upon the troy pound of the mint of the United States, in the manner following, to wit: The troy pound of this commonwealth shall be equal to the troy pound of the mint aforesaid; the pound avoirdupois of this commonwealth shall be greater than the troy pound aforesaid, in the proportion of seven thousand to five thousand seven hundred and sixty.

SECTION 12. And be it further enacted by the authority aforesaid, That the weight of any aliquot or fractional part of the troy pound and avoirdupois pound aforesaid, shall be proportionate thereto respectively, in the ratio of such aliquot or fractional part.

SECTION 13. And be it further enacted by the authority aforesaid, That it shall also be the duty of the governor to procure to be made for each of the counties of this commonwealth, at the charge of the counties respectively, a set of standards for weights and measures, according to the several denominations hitherto adopted into use in this commonwealth, which standards shall be accurately adjusted to the standards aforesaid. And thereupon he shall cause the same to be properly sealed or stamped, and to be delivered to the commissioners of the counties respectively, to be used as standards for the adjusting of weights and measures, and for no other purpose.

SECTION 14. And be it further enacted by the authority aforesaid, That it shall be the duty of the commissioners of the respective counties, at least once in every ten years, and oftener if they have reason to believe it necessary, to cause the standards of the respective county to be examined and tried, and if necessary, to be corrected or renewed according to the standards aforesaid, of the commonwealth, so that they shall be equal, and in all respects conform and correspond thereto.

SECTION 15. And be it further enacted by the authority aforesaid, That the duty of the inspector and regulator of weights and measures, shall in the several counties of this commonwealth (except in the city and county of Philadelphia) be performed by such competent person or persons as the commissioners of the respective county shall, with the approbation of the court of quarter sessions of such county, designate.

SECTION 16. And be it further enacted by the authority aforesaid, That every person charged with the inspection and regulation of weights and measures as aforesaid, shall, before he enters upon the duties of his office, make oath or affirmation to perform the same with fidelity.

SECTION 17. And be it further enacted by the authority aforesaid, That the persons who may be charged with the inspection and regulation of weights or measures, as aforesaid, shall not be entitled to demand or receive any fee whatsoever, for their services in that behalf; but they shall be paid for the same out of the county stocks according to contract with the commissioners of the respective county; they shall demand and receive for the use of the county for every weight and measure regulated by them, such sum as the mechanical labour employed in the regulation and sealing thereof shall be reasonably worth, and no more.

SECTION 18. And be it further enacted by the authority aforesaid, That all weights and measures, and all beams, scales, and steelyards, which shall be adjusted to the standards of the respective counties as aforesaid, by the officer charged with the duty of the inspection and regulation thereof, shall be authenticated or stamped by him with some sufficient brand or seal.

SECTION 19. And be it further enacted by the authority aforesaid, That if any person charged with the duty of the inspection and regulation of weights and measures, shall unnecessarily, carelessly, or through want of skill, mar or injure any scale, beam, steelyard, weight or measure, while in his hands or possession, for the purposes of his office, the same being just and true, or susceptible of easy adjustment to the proper standard, he shall furnish forthwith

to the owner thereof a correct scale, beam, steelyard, weight or measure, of the same kind, and of equal value, or in default thereof shall pay to such owner twice its value.

SECTION 20. And be it further enacted by the authority aforesaid, That all gauging instruments used within this commonwealth shall be constructed so as to show the contents or ullage of any vessel or cask, according to the measures aforesaid. And if any person shall use any such instruments of any other construction or proportion, such person shall, before marking the contents of any cask, or the ullage thereof, as shown by such instrument, reduce the same to the standard measures aforesaid, under penalty of ten dollars for every neglect, for the use of any person who may be aggrieved thereby.

SECTION 21. And be it further enacted by the authority aforesaid, That all weights and measures sold within this commonwealth, shall be deemed to have been warranted by the seller to correspond (according to the respective denomination) with the standards aforesaid.

SECTION 22. And be it further enacted by the authority aforesaid, That every person who shall sell or buy any article of merchandise, or traffic, or any thing whatsoever by any false yard, beam, scale, weight or measure, to the injury of another, the person selling or buying as aforesaid, being the owner of such yard, beam, scale, weight or measure, and not having had the same duly regulated and approved by a lawful standard within one year, shall forfeit thrice the value of the article so sold or bought, one half to the use of the county, and the other half to the use of the person aggrieved, to be recovered in one action, founded on this act: *Provided,* That in no case shall the penalty aforesaid, be less than three dollars.

SECTION 23. And be it further enacted by the authority aforesaid, That if any person shall sell or buy any article of merchandise or traffic, or any thing whatsoever, by any false yard, beam, scale, weight or measure, knowing the same to be false, and intending thereby to deceive or defraud, such person shall be liable to indictment and punishment as in cases of misdemeanor.

SECTION 24. And be it further enacted by the authority aforesaid, That an acre of land shall contain four thousand eight hundred and forty horizontal square yards of the standard yard aforesaid, or a surface which shall be equivalent thereto. *Provided,* That nothing in this section shall be deemed or taken to affect the allowance of any surplus quantity to which any person may be otherwise entitled by virtue of any record, patent, deed, or other instrument, or contract.

SECTION 25. And be it further enacted by the authority aforesaid, That the standard dimensions of a cord of bark, or of wood for fuel, shall be eight feet in length, including one half of the kerf, four feet in breadth, and four feet in height, containing one hundred and twenty-eight feet of the standard foot aforesaid, in solid measure, well stowed and packed. And if any part of the wood be crooked it shall be placed at the top of the cord or load, and a reasonable and fair allowance shall be made by all corders and venders of wood for the deficiency which may be occasioned by such crooked or uneven wood.

SECTION 26. And be it further enacted by the authority aforesaid, That a hogshead of cider shall be deemed and taken to be one hundred and ten gallons thereof, in wine measure, in all cases where there shall be no special agreement to the contrary.

SECTION 27. And be it further enacted by the authority aforesaid, That the several kinds of grain hereinafter mentioned, may be estimated and sold by weight avoirdupois, as follows, to wit: sixty pounds of wheat, fifty-eight pounds of rye, fifty-eight pounds of corn, forty-eight pounds of buckwheat, forty-seven pounds of barley, thirty-two pounds of oats, shall be deemed and taken to be equal each to a bushel as aforesaid, of the said kinds of grain respectively: *Provided nevertheless,* That the said kinds of grain may be bought or sold by measure as heretofore.

SECTION 28. And be it further enacted by the authority aforesaid, That the several kinds of foreign salt hereinafter mentioned, may be estimated and sold

by weight avoirdupois as follows, to wit: Eighty-five pounds of coarse salt, seventy pounds of ground salt, sixty-two pounds of fine salt, shall be deemed and taken to be equal each to a bushel, as aforesaid, of the said kinds of salt respectively: *Provided,* That the said kinds of salt may be bought or sold by measure as heretofore.

Section 29. And be it further enacted by the authority aforesaid, That anthracite coal may be sold by weight avoirdupois, or by the bushel measure as follows, to wit: Every bushel of coal shall contain eighty pounds thereof, every hundred weight shall be deemed and taken to be one hundred and twelve pounds thereof, twenty-eight bushels or two thousand two hundred and forty pounds thereof shall be deemed and taken for one ton.

Section 30. And be it further enacted by the authority aforesaid, That all pecuniary penalties and forfeitures imposed by this act, shall be recoverable in like manner as debts of equal amount may be recovered.

Section 31. And be it further enacted by the authority aforesaid, That, *Provided* that nothing in this act shall be construed so as to interfere with any special provision heretofore made by law, respecting the powers, duties, or emoluments of the regulator of weights and measures, or of the sealer of dry measures for the city and county of Philadelphia.

Appointment of the Committee on Weights and Measures.

At a stated meeting of the Board of Managers of the Franklin Institute, held June 13, 1833, the Chairman read the above communication from the Secretary of the Commonwealth of Pennsylvania; when, on motion, the communication, together with the accompanying documents, were referred to the annexed special committee, with instructions to report to the Board.

Committee—A. D. Bache, S. V. Merrick, W. H. Keating, R. Tyler, M. W. Baldwin, B. Say, A. Spencer, A. Miller, R. M. Patterson, M. D., S. C. Walker, B. Stancliff, T. McEuen, M. D., E. Draper, D. H. Mason, B. Reeves, T. P. Jones, M. D., F. Fraley, S. Moore, and Samuel Hains.

[to be continued.]

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN MAY, 1833.

With Remarks and Exemplifications, by the Editor.

1. For an improvement in *Trusses for Hernia;* Ralph Glover, city of New York, May 3.

The truss here described differs only in some minute points from many now in use. It is said by the patentee to be an improvement upon that of Messrs. Marsh, of Montgomery county, New York; this latter truss having a steel spring which passes but little more than half way round the body, whilst that in the one now described passes much further; it has, moreover, an oval pad at the back, instead of a round one. The rupture pad, also, it is said, stands obliquely upon the spring, and the manner of attaching it to the spring is not exactly the same with that adopted in some others. This comprises the information given in the specification.

2. For a *Horse Power;* Henry Buell, Randolph, Tipton county, Tennessee, May 3.

The machine here patented is called, by the inventor, in his petition, "an improvement in concentric machinery;" and in the specification we are told that it operates by "forming a central motion." However concentric the machine may be, the description of it appears, from its obscurity, not to be the product of a concentrated mental apparatus. Although we have called it a horse power, from its being so named on the drawing in the patent office, there is not one word said about a horse or any other animal, in the description of it; but we are told that "the power required to propel this machinery is applied to the arms of the centre shaft;" how this is done we will attempt to describe in a general way, so far as we understand the same. There is to be a vertical shaft, from which a horizontal shaft extends; on the outer end of the latter, there is a wheel which supports it, its periphery resting on the ground. As this wheel rolls round, the shaft revolves with it, and generates the motion, which is to be communicated to whatever is to be acted upon by it. At the end of the horizontal, close to the vertical, shaft, there is fastened a cog wheel, which has teeth upon its face towards the shaft, and is therefore a crown wheel: these teeth take into a pinion on the vertical shaft, to which it gives motion by the rolling of the horizontal shaft. The vertical shaft upon which the pinion is placed, is a spindle which passes up through an exterior tubular, vertical shaft, and has a pulley on its top to receive a strap or band.

The horse, or "power," is applied to a frame which surrounds the horizontal shaft, and allows it to revolve within it. This arrangement, we are told, "combines an amazing leverage, power, and velocity, together, through the centre;" and the claim is to "the centre shaft, the hollow gudgeon, and the mode of applying the power and velocity of machinery from the extremity to the centre, through the hollow gudgeon." This latter is not, we apprehend, the only hollow thing about the contrivance of this concentric machine, as it is more complex than most other horse mills, without having any solid advantage to counterbalance this complexity. The rolling wheel, on the horizontal shaft, by which the power is to be communicated, must be heavily loaded, or the friction upon its tread will be less than the resistance from the labour to be performed, and it will consequently slide round.

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3. For a *Machine for cutting Crackers;* George M. Kendall, Katskill, Greene county, New York, May 3.

The dough from which the crackers are to be made is placed upon a sliding table, that is moved forward by turning a crank, which crank also carries a roller above the board, so set as to reduce or roll the dough to its proper thickness. As the dough escapes from the roller, it passes immediately under a row of cutters extending across the board, and sliding up and down in a suitable frame. The cutters are connected together, are brought down by a lever, and are

raised again by spiral springs which surround their shafts. Dockers are placed within the cutters, and also pistons which force the crackers out as the cutters are raised. The lever is made to descend by placing the foot in a stirrup suspended from it. The claim is to "the application of the spiral springs, the lever, and stirrup operated upon in the manner above described."

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4. For a rule to be used in *Cutting Garments;* James G. Wilson, city of New York, May 3.

This is a rule, with various scales, designed for the same purpose as that described at p. 249 of the last number. The patentee says, "I do not claim the divisions of the measure, nor the invention of a plain ruler, nor the materials of which it is made; but I do claim the particular mode of the construction and improvements, and the uses to which these improvements may be applied." He should have told us distinctly what constitutes the special novelty in the construction, and the precise improvements in his rule, but he has not thought proper so to do.

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5. For a *Machine for Sawing Shingles;* Benjamin and Philo Bucknell, the former of Hunter, the latter of Lexington, Greene county, New York, May 4.

This machine is intended for sawing shingles by means of a circular saw, in a way which has been extensively practiced. The arrangement of the parts for holding the block from which the shingles are to be sawed, and of the carriage, racks, &c. which shift and advance the block, is considered as new; and a machine made upon the plan of the patentees is, they say, more simple, cheap, and durable, than any other. For one very similar to this, we refer to p. 34 of the present volume.

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6. For a *Combined Furnace Steam Boiler.* First patented February 18th, 1831, by Levi Disbrow, city of New York. Patent surrendered and reissued May 6.

At p. 387 of vol. vii. we have published the specification of the patent first issued, together with a drawing showing the general construction of the furnaces and boiler; and there is so little variation therefrom either in the description or the claim contained in the new specification, as to render it difficult to perceive the reason of the surrender; we presume, however, that the patentee would be able to furnish a good one. In the present instance, Mr. Disbrow has referred by letters to the drawings of his furnace, which, in every machine, renders the explanation much more clear than it can otherwise be made. In the former, he says that the object in view is "the application of anthracite or other coal to the purpose of heating," &c. In the present he says the "application of coal, or other fuel," &c.; intending thereby, probably, to indicate the use of wood. In the claim, as now given, he leaves out the words "he claims the mode of supplying such furnaces with coal by feeders passing into them from the

surface of the boiler;" the object of the surrender was, probably, the omission of this part of the former claim, which certainly could not have been sustained, whatever may be the case with the "combined furnaces."

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7. For an improvement in heating liquids, called the *Combined Furnace;* Levi Disbrow, city of New York, May 6.

The furnaces here employed are the same in form and substance with those described in the last patent. The difference in the thing claimed being that in the present instance the patentee speaks of the "application of heat to liquids in general, by means of two or more furnaces erected within the body of the liquid," &c. whilst in the former he says, "the application of heat to the boilers of steam engines by means of two or more furnaces for coal, or other fuel, erected within the boiler itself." To us the two things appear to be the same in form and substance; an impression which is fully borne out by the drawings. If the former patent was good, we do not perceive the necessity for the latter, nor indeed can it, if essentially similar, be valid. Were it so, the effect would be to lengthen out the first patent for nearly two years more than the term for which it was granted, and, upon the same principle, patents might be extended for an indefinite period.

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8. For *Boilers, or steam generators, and Wheels, for Locomotive Engines;* Stephen H. Long, Colonel of the United States Engineer Corps, May 6.

The improvements claimed in this patent are stated to be in addition to those described by the patentee in the specification of his patent of December 28th, 1832, which was noticed in the last volume; to this, therefore, we refer.

"The improvements described in this specification and specifically claimed as new and useful, are, 1st, the application of two or more horizontal, cylindrical boilers to locomotive steam engines, with flues leading through a portion of each, and, at the same time, one or more flues leading in the same direction exteriorly to the boilers, or between them and the apron. 2nd. the use of two or more horizontal cylindrical boilers with tubular flues, in connexion with a fire box. 3d. the introduction and use of steam chambers, disposed in such a manner as to enlarge the steam room within the boilers, while they reduce the quantity of water necessarily contained in the boilers. 4th. the construction of a grate with one or more oscillating bearers, the better to promote the combustion of anthracite coal or coke. 5th. a new method of causing a grate to traverse on an axle, by means of which the fireplace may speedily be discharged of its contents. 6th. the construction and application of a movable, or slip, chimney, on a new plan; and 7th. a new method of constructing wheels for locomotive steam engines."

We shall offer a slight sketch of some of these improvements, whilst others will necessarily be neglected, as they could not be well described without very extensive drawings.

The flues, or tubes, alluded to in the first item, are to pass longitudinally through that portion of each cylindrical boiler which is situated in rear of the fireplace.

The movable, or slip, chimney, consists of one chimney sliding within another, like the tubes of a telescope, with suitable contrivances for raising or lowering the sliding part in passing under bridges, &c.

What is the particular construction of the grate, with the oscillating bearers, we do not fully perceive, even with the aid of the drawings, which do not furnish any details, the model, which we have not seen, has probably been relied on to render this point clear, a proceeding, by the way, which we have repeatedly reprehended. By means of levers, which are attached to a pivot, or axle, one side, or end, of the grate may be let down, for the purpose of discharging the contents of the fireplace.

The wheels are to have cast iron hubs, with wooden felloes and spokes. The hubs are to be cast in two pieces, divided vertically through the boxes, or mortises, for the spokes, and having on one half a projecting ring, to fall into a corresponding hollow in the other. The two segments are to be secured together by suitable bolts, and are to be fastened to the axle by bolts passing through notches and mortises, in the manner of a linchpin. The spokes and felloes are to be made in the usual manner. The tire is to be made in two widths; one, which is the outer part of the rim, or tread, is to be flat, and of wrought iron; the inner portion is to be of wrought iron, or of steel, and is to be so formed as to rise conically towards the inner part of the tread, so as to adapt it to the different curvatures of the road. The flanch is to consist of a separate hoop of wrought iron, which is to be bolted on to the felloes on the inner side of the wheel. A wheel thus constructed the inventor denominates "the tripple banded wheel." It is proposed sometimes, however, to form the flat and conical parts of the tread of one piece, so that the wheel shall be double banded only, the flanch forming the second band.

The wheel, thus described, is not represented in the drawings, which certainly ought to have been done, in conformity with the requirements of the law to "accompany *the whole* with drawings and written references, whenever the nature of the case admits of drawings.

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9. For a *Water Wheel;* Andrew M. Braley, and John L. Dyer, Montgomery county, Illinois, May 7.

The wheel described is intended to act either as a mill or as a paddle wheel, and is designed to obviate the resistance from back water. There is much ingenuity in the proposed mode of construction, but, as is not unfrequently the case, it is expended upon a contrivance in which it will not be of any practical utility. The opposite floats, or buckets, upon a wheel are to be attached together by rods, or bars, *a a*, which are to slide through mortices in the shaft, or drum, of the wheel; the projecting parts, *b b*, of the floats are to

act against circular segments, so placed as to lift out the buckets which would otherwise be obstructed by back water. It is proposed to apply the same principle to undershot, overshot, and paddle wheels, and also to the sails, or shutters, of wind mills. There is a number of figures in the drawings intended to illustrate the various modes of accomplishing these objects.

The perpetual shifting, the friction, and the consequent wear, would of themselves suffice to neutralize all the anticipated advantages of this contrivance; and one practical experiment, we are convinced, will, or ought to, satisfy the incredulous of this fact.

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10. For an improvement in the mode of manufacturing *Dead eyed wood Buttons*, being an improvement on his former patent; Degrasse Fowler, North Bradford, New Haven county, Connecticut, May 8.

The former patent, above alluded to, was obtained on the 13th of June, 1831, and is noticed at p. 333, vol. viii. Instead of surrounding the wooden button with a metal rim, as there described, the whole face of the wood is to be covered with metal, tin plate for example, and the holes are to be punched through the metal and the wood, which will sink the bur of the former into the latter, and leave the holes perfectly smooth. The edges of the tin may be turned down so as to form a rim on the back of the button. When so made they are said to be more beautiful, stronger, and cheaper, than upon the original plan.

The forming buttons upon this plan constitutes the claim.

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11. For an improvement in the *Thrashing Machine;* Hardin Branch, city of New York, May 9.

We noticed in the number for last month, p. 254, a patent for an improvement in the beaters of thrashing machines, obtained by Mr. Branch, to which the present is so similar as to require a seer of no ordinary penetration to perceive the points of difference. Were it allowable to tell tales out of school, we might, perhaps, throw some light upon this apparently obscure affair, but this is contrary to established rules, which we will not violate.

The heads of the cylinder are to be of cast iron, with openings in the centre for the shaft. Near the circumference of each head there are to be holes to receive the rods which are to hold the beaters, and serve as hinges upon which they are to turn; these rods are to have a head on one end, and a screwed nut on the other. The beaters are to be of wood, faced with iron, and are to have pins, or teeth, driven into them: they are to be hung to the rods in any convenient way. "The mode of hanging the beaters, however, I do not claim as any part of my invention." Good, but what is it that you do claim? this is the main question; an answer to which is required by the patent law, but which, as on the present occasion, very frequently does, and must remain unanswered.

12. For a *Medicine called Houck's Panacea;* Jacob Houck, city of Baltimore, May 9.

Why will men be so obstinate as to remain sick for a long time, and at last to die, whilst panaceas, combining nearly all the virtues of the long sought elixir of life, are prepared by so many seventh sons of seventh sons in all our cities, and offered for sale at the numerous stores with tinted jars at their windows? Listen, ye sons and daughters of the wan countenance and the distorted visage, to the list of diseases which the medicine now patented will effectually cure; aye, effectually, and for ever, if you will only take a sufficient number of bottles in a given time.

Dyspepsia	Thrush, or sore mouth
Loss of appetite	Putrid sore throat
Indigestion	Croup
Inflammation of the stomach	Inflammation of the heart
Heart burn	Dropsy
Diarrhœa	Rickets
Dysentery, or flux	Diseases of the liver
Cholera morbus	Jaundice
Consumption	Obstructed menstruation
Influenza	Difficulty of making water
Colds	Gleet
Coughs	Hysterics
Inflammation of the chest	Nervous and scrofulous affections
Palsy	Mercurial and venereal diseases
Gout	Ulcers
Rheumatism	Sores
Inflammatory sore throat	Affections of the skin
Whooping cough	All diseases from impure blood

We are sorry, as it would secure the patronage of many of the best men in our country in favour of the patentee, that Intemperance is not found upon the list; and as the first ingredient in the prescription is twenty-five gallons of whiskey, it seems that the omission was not a thing of mere accident. That the recipe may not be lost should the patent office be burnt, and the patentee become the victim of his own remedies, we will place it upon our pages, and thus insure to it extensive diffusion and continued duration.

Rye whiskey . .	25 gallons.
Gum guac. . . .	25 lbs.
Sugar . . .	150 lbs.
Oil of juniper . .	1 lb.
Oil of lemon . .	5 oz.

Mix, incorporate well, and bottle for use. Take one table-spoonful before breakfast, two at 11 o'clock, and two on going to bed. Increase or diminish the dose agreeably to the feelings.

If one or two bottles do good, take more until you are quite well; and after you are quite well take more by way of confirmation. Give less to your babes.

The foregoing is the pith and marrow of the discovery, and the

practice under it, and we think, upon the whole, that the inventor merits the "everlasting" fame of Cromwell. Any one who should give this medicine in "inflammation of the stomach," "inflammation of the chest," and various other complaints in the enumerating list, ought to be made the subject of a presentment before a grand jury.

The patent law requires that an invention should be "useful," which has been defined to mean useful in contradistinction to frivolous, or mischievous. In the case of Lowell *v* Lewis, (1 Mason, 186,). Judge Story, in his charge to the jury, is made to say, "The word *useful*, therefore, is incorporated into the act in contradistinction to mischievous, or immoral. For instance, a new invention to poison people, or to promote debauchery, or to facilitate private assassination, is not a patentable invention." Under this view of the case, many a quack medicine, and this panacea among them, could not sustain, in court, its claim to legal protection. But who is to prove the injurious tendency of such a nostrum? no one, of course, but the instructed and regular practitioner; and if the charlatan has the good fortune to get his prescription condemned by such men, he obtains notoriety, and the sympathy of the vulgar, is considered as the victim of interested persecution, and thenceforward has a fair chance to roll in his carriage. Should the hopes of the philanthropist ever be realized in the universal diffusion of sound knowledge, this, among many other public evils, the result of ignorance, may find a remedy; otherwise we may continue to say, "as it was in the beginning, is now, and ever shall be." And let all the Quack Doctors say Amen.

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13. For a *Perplexing, or unpickable, combination Door Lock;* J. C. Leopold Daubreville, Ramapo Works, Rockland county, New York, May 13.

There are fifteen figures, and several of them not a little complex, referred to in the description of this lock; we shall therefore at once accede to the correctness of its title, and not perplex ourselves to pick it. All we can offer upon the subject is, that if the patentee will send us an engraving of his lock, and a copy of his description, we will give to his invention all possible publicity; a thing which, otherwise, we cannot attempt, although we have been informed by a competent judge that there is much merit in it.

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14. For an improvement in the construction of *Gearing for Horse Power;* Smith Gardner, Auburn, Cayuga county, New York, May 14.

The vertical shaft which is turned by the lever to which the horse is attached is to have upon it a toothed wheel of three feet in diameter; this takes into a pinion of ten inches, having a wheel of thirty inches diameter on its shaft; this wheel takes into a pinion of about seven inches, with a wheel of about twenty-five inches, which in its turn drives a pinion of about five inches, and this has a whirl, or pulley, upon its shaft, to receive a strap, or band.

There is not any thing claimed, or any thing to claim, as the whole

affair is a simple arrangement of wheels and pinions to get up the desired speed, without the slightest pretension to novelty in the arrangement, or in any other respect.

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15. For a *Fire Alarm;* James Dinsmore, Milburn, Somerset county, Maine, May 14.

This fire alarm is perfectly similar in principle to one noticed at p. 117, vol. ix., patented by J. S. Richardson, of New Hampshire. The alarm part resembles that attached to clocks, having a weight to it, which, in its descent, will cause a bell to ring. A latch prevents the running down of the weight, and a string connected to this latch is led over pulleys, and, like bell wires, around the apartments where fires may be likely to happen; when this string is burnt off a small weight is thereby liberated, which lifts the latch, and the alarm is sounded.

There is no claim made, and, the thing having been before effected on the same principles, there is nothing to claim.

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16. For a *Washing Machine;* James B. Dunkin, Union, Loudon county, Virginia, May 15.

This machine is like a barrel churn, revolving in a trough, but instead of being cylindrical, it is octagonal. Upon two opposite boards, forming the octagon, there are pins placed which project inwards, to cause the clothes to turn about.

The claim is to "the before described machine," and it certainly was best to claim it by wholesale, as when divided into its component parts, it would be difficult to find a new feature.

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17. For a *Standing Press;* Samuel Fairlamb, city of New York, May 15.

This press is to have the head and foot blocks of cast iron, with four wrought iron bars forming the cheeks, one at each corner, keyed above and below. In the centre of the head block is a female screw; at the lower end of the press screw, there is a bevel, or crown wheel, and the end of this screw swivels in a collar by arched piers attached to the platen. A horizontal shaft runs in bearings upon the platen, and a pinion, or small bevel wheel, on this shaft, takes into the teeth of the wheel on the lower end of the screw. There is a second pinion upon the opposite end of the horizontal shaft, which, however, is loose, as it is to operate only as a friction, or bearing, roller. There are cross bars on the end of the horizontal shaft, by which the press is to be operated upon, until the resistance transcends their power, when a compound lever is to be brought into action. For this purpose a ratchet wheel is fixed upon a horizontal shaft, within the cross bars. The compound lever is to be worked up and down like a pump handle, and has its fulcrum at one end, turning upon a pin projecting from one corner of the platen. A catch, having its lower end about four or five inches within the fulcrum of the lever, takes hold,

by its upper end, of the teeth of the ratchet wheel, and thus operates upon the press.

The claim is to "the application of the compound lever and ratchet wheel, to a standing press, and the fixture of the horizontal shaft, and the method of gearing the wheels."

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18. For a *Balance Lever Machine, for propelling machinery by water power;* Lucius H. Emmons, and George Upham, the former of Wellsburg, Brooke county, Virginia, the latter of Massillon, Stark county, Ohio, May 16.

A lever is to vibrate upon gudgeons, like the lever beam of a steam engine; from the centre thereof rises an arm, like the index of a scale beam, and a connecting rod, or pitman, from this arm, leads to the crank on a fly wheel shaft. The flume of the mill extends from one end of the beam to the other, and through gates, which are alternately raised and lowered, water flows into buckets, one of which is hung upon each end of the lever beam. The water causes these buckets to descend, alternately, and is let out by some suitable contrivance, when the bucket is down.

The drawing is very well executed, but there are no references to it, and therefore there are some matters of detail which are not rendered perfectly clear. The claims are "the application of the balance lever to water power; the peculiar construction and use of the buckets; the peculiar construction and use of the bucket rods; the form and peculiar construction of the gates and floom; and the whole as a machine for driving mills, and all kinds of machinery by water power."

This apparatus is intended to be used where the fall is not sufficient for the application of a wheel, but we are convinced that it will not answer well in practice. The fly wheel must be kept in perpetual and equable motion, to do which the buckets ought to be filled and emptied suddenly, which cannot be done. As respects the application of the balance lever to water power, or the obtaining of motion by the alternate filling and emptying of buckets, those who are acquainted with the history of hydraulic machines need not to be informed that a claim to these points would trench upon the doings of the ancients.

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19. For an improvement in the *Manufacturing of Horse Collars;* Horace Holton, Rochester, Monroe county, New York, May 16.

The specification of this patent tells us how to cut the leather for a horse collar from leather which is soft, and which will bear crimping, and also from leather which is too hard to crimp; but we are not informed in it wherein the method described differs from that followed by others; as we have never entered very deeply into this subject, we cannot supply the deficiency, or tell the patentee what he ought to have claimed, a point in which he does not, himself, appear to have been informed.

20. For *Blowing Blast Furnaces;* John Steece, Laurence county, Ohio, May 17.

The specification does not say one word about blowing blast furnaces, but merely tells us something about the tuyere through which the blast is to be conducted; and what it says about this, is not very luminously set forth, nor is there any thing to indicate where we should look for the novelty of the invention. To enable the cognascenti to judge for themselves, we will give an epitome of the whole specification.

The tuyere must be of sufficient substance; it should be of cast iron, about eight inches long, conical, and with a hole through it; the smallest end to be about the size of the pipe where the air is discharged, and the largest end of a size to admit the blow-pipe, and remove the cinders. The thickness may be about five-eighths of an inch at the small, and three-eighths at the large end.

Preparation for receiving it must be made in the tuyere arch, with good clay mortar, when the tuyere is to be pressed in, in a proper place and direction for conducting the air into the furnace, and all is then done.

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21. For *Friction Rollers;* George Danforth, Centreville, Wabash county, Illinois, May 17.

We have here Mr. Garnett come again. A row of rollers, connected by gudgeons working freely in holes in two rings, are to surround a shaft or axle, and to roll within a box or hub, and this "is believed to be original" by the patentee. How many years Garnett, the inventor of them, has been dead, we know not; but this we know, that they have been pictured in nearly every book of mechanics, in all the languages of Europe, for half a century, at least.

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22. For a *Thrashing Machine;* Edmund Warren, city of New York, May 17.

The cylinder of this machine is to be made of wood; the beaters or teeth consist of separate pieces of cast iron, notched across, and are to be fastened, in rows, on to the cylinder by means of iron hoops, notches being cast in them to receive the hoops. The concave is of iron bars, and the frame is in the form of a rectangular triangle, or rather of the quadrant of a circle, standing on one of its straight sides. The claim is to the segments and hoops of the cylinder, and the form of the frame for cheapness.

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23. For an improvement in the *Grist Mill;* Luther Olds, Onconta, Otsego county, New York, May 18.

This portable grist mill is, in its general construction, like many others; but it claims to be improved in the form and action of the bridge tree; in the manner of hanging the runner; and in a mode of blowing air through the eye of the runner, so as to pass between the stones, which is to be accomplished by revolving fans running within a drum, by a blast from bellows, or from a fall of water. We are

told that by these improvements friction is reduced, greater speed obtained, less propelling power required, and the flour is kept cool.

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24. For an improvement in the mode of *Dressing Woollen Cloth, and cloth partly of wool, and partly of cotton;* Calvin W. Cook, Lowell, Middlesex county, Massachusetts, May 20.

We are informed that the patentee of the above named improvement is engaged in experimenting in order to render his process as perfect as possible, and may probably find it necessary to obtain a new patent when his experiments are completed; we therefore omit any notice of the invention until we can present it in its most perfect form.

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25. For apparatus for *Generating Heat for the Forging of Malleable Iron, and of Steam for driving machinery;* Peter J. Clute, city of Schenectady, New York, May 20.

A steam boiler is to have under it a number of furnaces, which are to be used for the double purpose of heating iron and of generating steam. The kind of boiler preferred is the ordinary cylindrical boiler, and the furnaces stand in a row, transversely to the boiler, the furnace doors being at the sides of the stack by which it is supported. As regards the number of furnaces to each boiler, the following is given as an example. If the boiler be twenty feet long, and thirty inches in diameter, there may be seven furnaces, which may be of the following dimensions, or proportions. Distance of the grate from the boiler, one foot; length of grate eighteen inches, width eight inches; the width of the furnace must be governed by the grate. There is to be to each furnace an aperture at either end, of eight inches in width, and six in height, for the admission of coal. The distance between each grate, it is said, is to be three-eighths of an inch; this, we suppose, means the distance between the bars of the grate, as we cannot perceive how seven grates, each eight inches wide, can be made to extend twenty feet, if they are only three-eighths of an inch apart.

Under each grate there is to be a box, called a receiver, by the patentee; this is to serve as an ash box, and a receiver for a blast of wind, which is to be blown into each furnace. A blowing cylinder is to be worked by a steam engine supplied from the boiler, and each furnace has a pipe which terminates in the box below the grate, all of which pipes are fed from one common main. An aperture, six inches in width, and three in height, is left, at each furnace, for the introduction of the iron to be heated, valves closing them when not employed.

Whether the furnaces are to be divided from each other by a partition wall, or whether there is to be any particular arrangement of the flue, or flues, are circumstances not alluded to in any way.

The claims are to the using a number of furnaces to raise steam; the heating the boiler at many different points; the employment of the steam raised by these furnaces to the blowing of the bellows; the application of the blow-pipe to ignite anthracite for raising steam; the using the same fire for the double purpose of heating iron and raising steam, this latter being considered as the most important feature

of the invention. Among the things enumerated to which this apparatus may be applied, is the propelling of boats; but if the distinguishing feature of using the furnace for heating malleable iron, whilst the heat generates steam for driving machinery, be retained, there must be a travelling smithy on board the boat, a thing which some passengers might not approve.

The claims are certainly too general, "the using a number of furnaces to raise steam," is a thing which has been repeatedly done, or proposed. The surrendered patent of Mr. Disbrow, noticed at No. 6, in the present list, was for using a number of furnaces to raise steam. The employment of a portion of the steam power to blow the bellows, does not carry with it the idea of originality, however original it may be with the patentee.

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26. For a *Mathematical Measurer for the use of Taylors;* Daniel Williams, city of New York, May 22.

When Dr. Gregory published his "Mathematics for Practical Men," we were apprehensive that he was more liberal than correct in taking it for granted that all mechanics understood algebra; we have now, however, so many mathematical measures introduced by one class of mechanics as to afford a presumption that the estimate of the Doctor had some foundation in fact.

As we have already put in the plea of *non-compos*, when the art of cutting cloth in such a way as to adapt it to the various contours of the human form, is the subject of discussion, we shall not attempt to give a particular description of this new instrument for the laying down of plain and spherical triangles for this purpose; we will remark, however, that the base of the instrument is a straight scale, having spirit levels at each end, to place it horizontally upon the back, or elsewhere; and that there are two measures divided into inches, rising rectangularly from it, intended to ascertain the latitude, longitude, or declination of the body terrestrial. We presume that there is much of novelty in the affair; and the patentee appears to think it altogether new, as he has not made any claim, either particular or general.

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27. For an improvement in the *Paddle Wheel* used for steam or horse boats; James P. Espy, city of Philadelphia, May 22.

(See specification.)

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28. For an improvement in the *Enema Syringe;* John Pearshall and David Gilbert, Gettysburg, Adams county, Pennsylvania, May 22.

This syringe is undoubtedly new in its construction, and so far is entitled to a patent. It is made in part of pewter, and in part of a caoutchouc bag; the portion made of pewter is somewhat in the form of a common syringe, but with the body part short, and having a tube at each end; on the middle of the body part there is a small opening with a neck, to which the caoutchouc bag is to be attached, which then stands at right angles with the body of the syringe. One of the

small tubes is to be passed into the rectum in the usual way, the other is to curve so as to dip into a vessel containing the liquid injection; on the inner end of this latter tube there is a valve opening inwards, towards the body of the syringe, and another valve opens outwards at the inward end of the injecting tube. The caoutchouc bag is to be squeezed together, and then, on allowing it to expand by its own elasticity, it will draw the fluid into itself from the containing vessel, which, on squeezing it, will be injected; this operation is to be repeated whilst it is deemed requisite. The pewter part of the instrument screws together for adjusting the valves, and for convenience of package.

Although we believe the contrivance to be new, we do not think it likely to go into general use; the two valves will be troublesome when used with the tenacious kind of fluid frequently employed, and the administration will be much less convenient than with the more common instruments.

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29. For *Manufacturing Clock Wheels and Pinions* by casting them with their teeth and leaves; James S. Seger, city of New York, May 22.

Moulds are to be made in which the wheels and pinions of clocks are to be cast in a finished state; tin, or any other suitable metal being employed in their formation. The claim is to the "manufacturing of clock, or time-piece wheels, by casting them with teeth in them." We believe that there has been another patent taken out with a similar view, but have not taken time to examine it.

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30. For a *Sheet Iron Fireplace;* Jesse Ingalls, Sandbourton, Strafford county, New Hampshire, May 23.

The jambs of this fireplace are to be covered with sheet iron, the back being brick, as usual. The flue also, to a considerable height, is to be of sheet iron. The sheet iron forming the front of the flue should, at the lower part, be as wide as the throat of the chimney, but it may be narrowed, pyrimidically, as it ascends; at the upper end of it, the brick flue of the chimney commences.

The usefulness of this flue is said to consist in its "warming a room in less time, and with a less quantity of fuel than any other fireplace now known." It is proposed sometimes to carry the sheet iron up through the ceiling of a room, into that next above it.

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31. For an improvement in the *Vibrating Steam Engine;* Nathan Rowland, Philadelphia, May 24.

This engine is, confessedly, very similar to that patented by Mr. Costil, of Philadelphia, about two years since, the main difference being in the manner of arranging the parts which operate as valves. The cylinder is to vibrate on trunnions at its centre. The steam pipe consists of a flat tube, placed usually on the under side of the cylinder, and curved so as to form an arch, of which the trunnions are the centre. This tube is faced truly, and has in it two

steam ways, leading from near its centre to either end of the tube. Under this is a concave steam box, fitted exactly to the arched steam tube, so as to form valve seats; in this there are openings for the alternate admission of steam to, and its discharge from, each end of the cylinder. The steam box is to have its bearings regulated by screws.

We are not aware of any advantage which this mode of arranging engines offers above that of Mr. Costil, and the fitting of the valves will, we apprehend, be attended with somewhat more difficulty.

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32. For an improvement in the mode of *Boring or Rimming Holes, either straight or curved,* by an instrument denominated "The Compound Slide and Groove Borer, or Rimmer;" Zebediah Holt, Chelmsford, Middlesex county, Massachusetts, May 27.

This apparatus is intended to bore, or rim out, hubs, and boxes, of any kind required for machinery, so as to give to the longitudinal section of the hole either a straight or curved form, as may be desired. Suppose a hub, or box, to be fixed in the lathe, and it is desired to rim it out barrel shaped, that is, larger in diameter in the middle than at either end; a mandril is to be inserted to serve as a guide to the cutter, and in order that it may perform this office in the way desired, a groove is made along the mandril, in which groove the cutter is to slide; were the mandril cylindrical, and the grooves of equal depth, the cutter advanced along it would cut the hole cylindrically, but if the groove is of less depth as it advances towards the centre of the hole, the cutter will be forced outward, and cause the bore to be larger there, and will throughout its whole course conform to the curvature given to the bottom of the groove.

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33. For an improvement in steam power, by means of the "*Horizontal Steam Engine;*" Charles Curtis, city of New York, May 28.

On account of the numerous difficulties attending the construction and use of rotary steam engines, it has been generally attempted to give to the working parts the utmost simplicity of which they are susceptible, but even with this precaution they have hitherto been failures. If we admit the *prima facie* evidence of the engine before us, we think that it will go far to prove that there was a conviction in the mind of the inventor that nothing more than complexity was necessary to remove the difficulty; and that as regards the description, which the law says shall be "full, clear, and exact," these requirements were best fulfilled by furnishing one which is altogether general and obscure.

We have pored over the affair as long as we dare without neglecting the calls of other inventors, and we leave it with the impression that we had much rather receive the money which a well made engine of this construction would cost, than the probable product of its operations during the term for which the patent is granted.

34. For a *Safety Steam Boiler;* Charles Curtis, city of New York, May 28.

A safety boiler is a very desirable thing, and should the one here patented justify its name, the inventor has our best wishes for a most substantial reward; were we to venture upon augery, however, it would be under auspices which we should deem unfavourable. We here find some difficulty from the same cause as that which we mentioned in the last article, namely, the obscurity of the description. That our readers may judge between us and the inventor on this point, we will make a quotation from the first part of the specification, which is as follows:—

"First. Seven boilers, more or less, made of copper, wrought iron, or other suitable metal, in form of a circle two inches in diameter, more or less, and forming a circle of nearly ten inches in diameter, the shells of which are one-fourth of an inch thick, more or less, all of which boilers are placed upon a frame, in a perpendicular position, close to each other."

According to the best of our judgment, aided by the drawing, we suppose that each of these boilers is to be in the form of a shallow drum; that they are to be bolted together, so as to form, when united, a cylindrical boiler, consisting of seven compartments, and that the fire is to be made in the middle of them; for which purpose, the centre of each drum, excepting the last, is removed, and a common furnace thus formed. These separate parts are to be connected by tubes, and other tubes are to lead from the upper part of them into a steam chamber. There must, of course, be smoke flues, supply pipes, and other appendages, some of which are described, if description it may be called, where the style and manner throughout are in perfect keeping with the quotation above made.

The claim is to "a boiler in the form hereinbefore specified, particularly the form of each boiler which composes the main boiler."

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35. For a *Composition for Painting*, called the Stone Composition; Elijah Skinner and John Webster, Sandwich, Strafford county, New Hampshire, May 28.

Pulverized fire stone, or soap stone, is to be ground in oil in equal quantities with white lead; and the claim is to "the introduction of this particular species of stone into the common composition of paints."

Whether this particular species of stone has, or has not, been ground with oil to paint our houses, we do not know, although we recollect many other earthy matters which have been so used, such as gypsum, barytes, chalk, road dust, &c.; it, however, enters into the composition of paint for another purpose, namely, the cheeks of ladies, being one of the ingredients in rouge. As the paint of the patentees is to be ground in oil, and as the ladies have a prior right, there will not, we presume, be any dispute between them.

36. For a *Fireplace;* Levi Mansfield, New Hartford, Oneida county, New York, May 29.

This contrivance is most imperfectly described, refers throughout to a model, and makes no claim to any thing; yet, from its style, we apprehend that it is drawn up by a gentleman learned in the law. This new fireplace is to be placed within that usually found in a room, and, we suppose, that it is to be made of cast iron. The hearth is hollow, consisting of a shallow box, having two holes at the front corners for the admission of air, which air, we are told, "is carried into the main flue of the invented fireplace by two smaller flues, one on each side of the invented fireplace." The fire is represented as being made in a grate, like that commonly used for anthracite; the purpose, therefore, of carrying the air from the hollow hearth into the main flue, back of the fire, we cannot guess.

The main flue is to be made wide, and shallow, behind the fire; the plate against which the fire rests is to operate as a kind of register, being hinged at bottom, and falling back so as to regulate the opening for the draft. At a little distance up, the flue is contracted, and so formed as to receive a round pipe, which is to be returned by an elbow through the chimney, into the room, and conducted wherever it may be required. "An extra movable back, which is concave, is to be used when the fireplace is used for cooking;" and this is all the information given as relates to this part of the invention; the apparatus appears to be as happily conceived, as its construction is felicitously described.

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37. For the *Application of Steam to the Heating of Liquids;* Joseph B. Armstrong, Wilkes county, Georgia, May 29.

This new application of steam consists in the conveying it in two or more tubes, instead of in one only, into the liquid which is to be heated; or in conveying it in a single tube to the vessel containing the liquid, and then divided so as to pass through two or more tubes. "as the heating power of steam is greatest when most divided."

If the patentee had been a subscriber to, and had read, the Journal of the Franklin Institute, or any of the works which describe the different mechanical inventions of the day, he would not have taken a patent for a general principle, which has been carried into operation in sugar boilers, and other evaporating vessels, under numerous modifications; as he then could not have avoided knowing the fact.

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38. For a *Machine for Hulling Cotton Seed;* Laucelot Johnston, Madison, Morgan county, Georgia, May 29.

An outer case is made of strong timber, or staves, hooped together, in the form of the common churn. It may be fourteen inches in height, ten inches in diameter in the clear, at top, and twelve at bottom. Into this a wooden nut is fitted, to run vertically, the shaft of which is extended below the machine so as to receive a whirl, for a band. The inside of the case, and the surface of the nut, have cast steel teeth set in them spirally, which, in the one in use, amount to five thou-

sand. A hopper at top, is used for feeding. Motion is given to the whirl by the common running gear of a cotton gin.

The patentee says that the foregoing machine hulls 150 bushels of seed in ten hours, producing fifty bushels of clean seed, which is separated from the hull by passing over an inclined screen, kept in motion by a knocker. The hulling, it is said, is effected by cutting, and not by rubbing.

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39. For an improvement in the method of *Casting Boxes for Carriage Wheels;* William Butler, and Edward B. Rice, Worcester, Worcester county, Massachusetts, May 31.

The object in view is to make cast iron boxes which shall be hard and smooth in the inside, so as to be durable, and not to require boring, or rimming out. The method of attaining the end, for which this patent is obtained, is the using of a hollow metal core: that which the patentees have employed being strong sheet iron, truly turned. The sheet iron, it is said, heats readily by the pouring of the metal upon it, and thus becomes expanded; whilst, by its cooling more rapidly than the body of the box, it contracts, and is readily detached from it, when the work is taken from the flask. With a solid core this is not the case, the metal being set before the core has undergone much expansion, which causes the box to crack, or to adhere so firmly to the core that it cannot be removed.

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40. For a *Propelling Horse Power;* Gilbert Griffen, Greece, Monroe county, New York, May 31.

This machine is made just like the old fashioned horse mill, but the large crown wheel is at the lower end of the vertical shaft, has the teeth on the lower side of it, and takes into a pinion, the horizontal shaft of which works in a trough under the feet of the horses. The levers by which the horses draw, are, of course, above the driving wheel.

Specifications of American Patents.

Specification of a patent for an improvement in the Paddle Wheels of Steam-Boats, and Horse-Boats. Granted to James P. Espy, *city of Philadelphia, May* 22, 1833.

The paddle wheels now in use are constructed on the principle, which is false, that if the paddles were closer together, they would each strike on water that is already in motion from the action of the paddle which entered just before it, and that the power of the wheel would be thus diminished, whereas my wheel is constructed on the principle that the thinner the slices of water are cut the better, with the limitations hereafter mentioned. Again, the wheel now in use is constructed with the paddles so wide apart, that each paddle can derive no advantage from the water that comes in between from be-

low and at the sides, in consequence of the removal of the water by the paddle which entered the water next before it; for it rises out of the water without coming near it, whereas my wheel is constructed so as to take advantage of this water, and increase its quantity.

In the paddle wheels of steam-boats and horse-boats now in use, constructed according to the received theory given by Renwick, on the Steam Engine, page 272, and Tredgold, page 318, it does not appear that as many as twenty consecutive paddles are ever employed on one wheel, and the number is generally much less; now these paddles are so far apart, that notwithstanding their backward motion is greater than my wheel will be, they enter the water and pass out of it, leaving, in consequence of the forward motion of the boat, large portions of water untouched, and of course its inertia unemployed in propelling the boat forwards, thus a less effect is produced than would be if all the intervening water should be put in motion with a velocity equal to the paddles themselves. These defects I propose to remedy by increasing the number of consecutive paddles from twenty to one hundred, or upwards, as may be found convenient; and thus by cutting off thin slices of water, each paddle will be enabled to move, with its own velocity, all the water between it and the contiguous paddle, and also take advantage of, and increase by the great number of paddles, the quantity of water which may come in between the paddles, from below and at the sides, in consequence of the removal of the water by the paddle next before it; certainly on the present construction of the paddle wheel, no advantage is derived from this new accession of water.

According to this view of the subject it appears diametrically opposite to the universally received theory and practice, (see Renwick and Tredgold, as quoted above,) that the *greater* number of paddles the better, provided they could be made indefinitely thin, and without friction in the water. In practice, however, the thickness of the paddles, even if made of sheet iron, and very thin, as they should be, bear some proportion to the intervening spaces, and therefore, it is believed (though the exact number producing a maximum effect has not been ascertained by experiment,) that about sixty or seventy consecutive paddles will be the most suitable number for wheels of about twenty feet in diameter. If the wheels are smaller it may be desirable to use a less number, though I have found by experiment that with wheels of twenty-six inches in diameter, forty-eight paddles are better than twenty-four, or twelve, though the paddles were only about one inch and three-quarters apart when forty-eight were put on the same wheel.

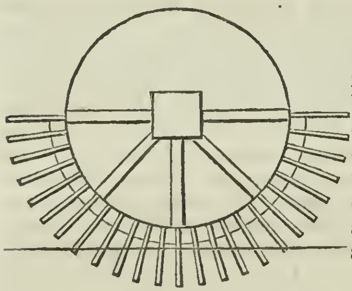
It is, perhaps unnecessary to add, that all the effects of violent percussion and irregularity of motion, will be more effectually obviated by the great increase of the number of paddles, or floats, than by the tripple paddle wheel, the most approved one now in use, which Mr. Renwick, (p. 272,) says was introduced by Mr. Stevens, and which evidently derives its popularity from the universal belief that it would not do to put the paddles so close together as to obviate this difficulty; for though my paddles reach across the whole face of the

wheel, eight or twelve being in the water at once, each receiving, contrary to the existing theory, almost as much reaction from the water as if it was in alone, the shock which *one* makes on entering the water cannot be felt.

The drawing deposited in the patent office represents a section of one half of the wheel which I used in my experiments to demonstrate the truth of the theory advanced by me above; it was twenty-one inches in diameter, and the paddles forty-eight in number, eighteen inches long, that is, the whole breadth of the wheel, and three inches deep in the water.

What I claim as new, and as my own invention, or discovery, in the above described paddle wheel, and its operation, is, that a greater effect, from the inertia of the water, is produced by the introduction of a greater number of consecutive paddles, than was ever before used. on the prinicple of putting all the water in motion with the same velocity as the paddles themselves, and also that which comes in between the paddles in consequence of the removal of the water by the paddles as they move through the water, as explained above. I ground my claim on the discovery of the fact, confirmed by experiment, that forty-eight paddles, contrary to the received theory and practice, as explained above, are better than twenty-four, or twelve, succeeding one another in the same wheel. And I therefore claim the exclusive application of a greater number of consecutive paddles to paddle wheels than have ever been used before; thus taking advantage of the above explained principle and fact by me discovered.

JAMES P. ESPY.



Section of half a paddle wheel of forty-eight paddles, which proved by experiment to be superior to one of twenty-four paddles, and also one of twelve. There are eight paddles in the water at once, each of which, it is believed, does nearly as much work as if only one was in at a time.

ENGLISH PATENTS.

To JOHN LIHOU, *Esq. for his invention of an improved method of constructing Capstans. Sealed* 10*th January* 1832.

The object of the inventor is to construct a capstan capable of exerting great power in raising the anchor, and which may be worked by a smaller complement of men than ordinary capstans or windlasses—a matter of very great importance on ship-board, in boisterous weather.

The following is the specification, to which no drawings are appended:

The nature of my said invention is to facilitate the use of capstans on board ships and other vessels; and which said invention is more particularly applicable (though not exclusively) to capstans with two bodies, commonly called double capstans, as the same are used on board the larger description of ships and other vessels; and the manner in which my said invention is to be performed with reference to such double capstans, is as follows:

I use a strong, horizontal, bevel-toothed wheel, made of iron or other suitable material, which is to be firmly secured on the drum-head of the lower body, or on the lower body, as hereinafter is mentioned. By the word "body" I mean the barrel, with the whelps attached thereon. The diameter of the said wheel should not be less than the usual diameter of the said drum-head, but as much larger as it can be conveniently made, without being in the way of the men when engaged about the duties of the ship. This wheel is to be actuated by a suitable pinion made of iron, or other suitable material, or by two or more such pinions, which are to be worked independently of each other. The diameter of each of the said pinions may be generally made equal to about one-fourth, one-fifth, or one-sixth of the diameter of the said horizontal wheel, more or less; the particular dimensions of such pinions being adapted to the production of the power to be derived therefrom; the axle or axles of the said pinion or pinions being placed in a horizontal position, and supported or retained by, and between, suitable frames or braces made of iron, or other suitable material, attached to the beams or carlings of the deck, immediately over the said pinion, or pinions, by which arrangement the space below the said pinion, or pinions, will be kept quite unoccupied and unincumbered for the ordinary duties of the ship.

The said pinion, or pinions, are to be thrown in and out of gear when required, by any one of the well known mechanical contrivances commonly used for such purposes, and may be actuated by hand or by any other means.

When the said pinions are to be worked by hand, there is to be attached to the axle of each of the said pinions a strong crank handle, or winch handle, or a series of crank handles, or winch handles, which ever shall be found most convenient, according to the number of the men required to work the same. The axle of the said crank handles may be entirely supported by frames or bearings, attached to the beams or carlings of the deck above, (as already described for the axles of the pinions,) or the said axles of the crank handles may be supported by the deck stanchions; the pinion, or pinions, being so placed as to work in a fore and aft, thwartships, or other direction, as will be most convenient for working. For this purpose, in vessels of war I recommend that two pinions be used, and so placed as to be worked, one afore, the other abaft, the said lower body in midships; which positions will be found to interfere least with the men employed about the duties of the ship.

The axle of the said pinion, or axles of the said pinions and crank

handles, must be respectively placed at such a height from the deck on which the said lower body revolves, as will enable the men to work the cranks to the greatest advantage; and the drum head of the lower body must be placed at a suitable height from the same deck accordingly; and, if the drum head of the lower body be too high to admit of the before-mentioned horizontal wheel being fixed upon the drum head, at a suitable height between decks, for the axles of the pinions to be properly placed for working the crank handles to the greatest advantage, in that case the said drum head may be entirely removed, and the said horizontal wheel is to be fitted to bind the lower body together, instead of the said drum head, the centre part of the said wheel forming a suitable and efficient drum head (which may be furnished with bar holes if required,) thus leaving more room for the messenger to pass round the whelps, than if the drum head had been lowered.

In this capstan, I use a spindle of wrought iron, or other suitable materials, which said spindle is firmly connected or attached to the upper drum head and upper body with which it revolves in its bearings; but the lower part of the said spindle is to be perfectly round, and to turn freely in the centre of the lower drum head and lower body; but, when it is required to connect the said lower body with the spindle and upper body, I propose to use a clutch moving up and down on the said spindle. This clutch may be easily put in and out of gear by means of a lever or any other similar well known contrivance, but this is no part of my invention.

By the foregoing arrangements it will be seen that the lower body being attached to the spindle by means of a clutch, the upper and lower bodies may be worked by means of my said horizontal wheel and pinions, without the use of the capstan bars, or the capstan bars may be used in the ordinary way at the drum head of the upper body, at the same time that the wheel and pinions below are being worked, in which case the power acquired by the machinery, and the power acquired by the bars, will be combined, and the power of the capstan in both bodies will be thereby materially increased; or the pinions may be withdrawn or thrown out of gear, as above described; and thus, both the upper and lower bodies worked entirely by the bars in the drum head of the upper body, as in the ordinary mode of using capstans. Also, by lifting up the clutch and detaching the lower body from the spindle, the lower body may be worked by means of the said wheel and pinions, while the upper body and the spindle remain stationary, or the upper body may be worked by the capstan bars in the ordinary way, and the lower body can, at the same time, be worked by means of the wheel and pinions in the same direction, and at a different velocity from that of the upper body, or the upper and lower bodies may be worked at the same time in contrary directions, whereby the said double capstan may be made to perform the office of two separate and detached capstans, or unite their powers, without the inconvenience of applying bars to the drum head of the lower body; and by these means the use of capstans is very materially facilitated.

When the said pinions are actuated by hand I propose as a greater

security to the men working the crank handles, to increase the number of times which the capstan shall paul or catch during each revolution; for this purpose, I recommend that the hanging pauls shall be eight in number, and that there should be eighteen stops or catches for the same; half the said number of pauls to be of one equal length, and the remaining half of another equal length, in order that the capstan may paul thirty-six times during each revolution; but this is no part of my invention.

The above described method of fitting a double capstan may, in many cases, render the upper body unnecessary. In every such case a double capstan may be converted into a single capstan by merely removing the upper body, and either letting the spindle through the deck below, (as is usual in single capstans,) or by cutting it off even with the deck above. I therefore do declare, that my claim extends to the adaptation of my said invention to single capstans, as well as double capstans, whenever the former are situated between the decks of a ship; and further, single capstans may have the advantage of my said invention, by fixing the above mentioned horizontal toothed wheel securely to the spindle below the deck on which the said capstan revolves, so as to be worked by a pinion or pinions as hereinbefore described, and such single capstan may be situated either on the upper deck or elsewhere; I therefore claim the exclusive privilege of constructing capstans with the horizontal toothed wheel attached to the drum head, or fixed to the top of the body, or to the spindle of capstans, and worked by means of pinions applied in the manner hereinbefore described.

An ingenious mode of hanging the rudder of a large ship was also invented by the patentee, (see vol. iv. of our second series, page 64,) which appears to have been approved, and very extensively adopted by the Navy, and we understand that the Admiralty have, in consequence, promoted the inventor to a Captaincy. EDITOR.

[*Lond. Jour.*

Patent granted to JONATHAN DICKSON *and* JAMES IKIN, *Engineers, for improvements in the process of making Gas from Coals or other substances. Dated February* 6, 1832.

This invention consists of three improvements in the apparatus and process of making gas. First, in the manner of setting the retorts, and means of applying the fuel. Secondly, in a mode of cooling, condensing, and purifying the gas by absorption in a vacuum; and, thirdly, in a manner of producing a vacuum to the apparatus connected with the retorts, whereby such apparatus and retorts are not subject to pressure. First, of the setting the retorts. The patentees state that the common way of heating retorts is to keep a small quantity of fuel in a high degree of combustion, and by the assistance of a chimney or other means, a strong draught or current of heated air and flame is caused to pass in various directions amongst and against the retorts.

which are placed in what is called an oven, or furnace, and in this oven, or furnace, brickwork or other guards are generally placed between the fire retorts to save them from the intense, destructive heat, and to disperse the flame and current of heated air. Now the object of the first improvement is to keep a large quantity of fuel in a low degree of combustion, and closely shut up in chambers of brickwork or other materials, which chambers are called kilns. In these kilns the retorts of any shape or size are placed, in any position, in immediate contact with, and surrounded on all sides by, the fuel which heats them; consequently, these retorts will generally have the same degree of temperature as the ignited fuel that touches them, and this heat is regulated by the admission of atmospheric air through holes or openings, having doors, or dampers, for the regulation of such admission. By this improvement the patentees state that the operation of distilling gas may be conducted without the aid or use of a chimney, and by only burning coke, or cinders, and thus obtaining a considerable saving in fuel. The drawing attached to the specification represents ten retorts set in brickwork, leaving a space all around, which is filled up with coke, closely in contact with all parts of the retorts, which, when lighted, becomes one mass of fire, and the same may be kept at a regular temperature, by means of the quantity of atmospheric air admitted. By this improvement the patentees conceive that a great saving will be effected, particularly in fuel, as the object is to use coke in the place of coal, whilst, at the same time, the retorts not being subject to violent draughts, and consequent unequal action of the fire, will not be so quickly destroyed. The second improvement relates to the purifying and condensing of gas in a vacuum. This improvement is applied after the gas has passed the hydraulic main, and has, consequently, deposited its coal tar and ammonaical liquor in the ordinary way. It should be observed, that the ordinary mode of cooling, condensing, and purifying gas, is, by causing it to traverse a succession of vessels or pipes, varying in length to upwards of 1500 feet, which are sometimes exposed to the atmosphere, and sometimes placed under ground, but more frequently surrounded by water, from thence the gas passes through, and is washed by water, and is also passed through beds or layers of lime, in the common lime vessels, or purifyers, which causes considerable strain or pressure to the retorts, and other parts of the apparatus. The object of the improvement in this part of the apparatus is to carry on the process of gas making, without causing such pressure to the apparatus, the gas is permitted to flow freely through the hydraulic main to the gasometer, and, at the same time, is brought into immediate contact with water in the form of showers, streams, or jets; and as ammonia and water have a great affinity for each other, the ammonia will be taken up by the water; and if there be an admixture of lime, the sulphur will also be separated from the gas. The apparatus for effecting this part of the invention consists of a vessel, having a succession of shelves, which are perforated with holes, down and through which the water runs in streams; and the shelves being placed alternately, from side to side, and sloping downwards, the water is con-

tinually changing its course, as it flows downwards, and the gas being admitted at the lowest parts rises in an opposite direction, is constantly acted on by the water, and is thus condensed and purified. There are also perforated shelves containing lime, through which the gas passes, the more perfectly to accomplish the purification. This second improvement is said to be greatly facilitated by the action of the third,—that of a means of producing a vacuum to the parts described; and this consists in attaching a pipe from the upper part of the last described vessel to an apparatus somewhat similar to a Savary's steam engine. The first cylinder is to be full of water, which is forced from this cylinder into the second cylinder, by the pressure of steam, and when the first cylinder becomes full of steam, and the other full of water, the steam cock is closed, and the gas cock from the purifier and condenser last described, and which is connected to the second cylinder, is opened by this means, as the steam becomes condensed in the first cylinder, the water flows back, and the gas fills the space left by the water in the second cylinder; the steam cock is then again opened, which drives the water from the first into the second cylinder, and thus the gas is driven forward out of the second cylinder to the gasometer, and this action is constantly kept up during the production of gas.

The patentees claim the three improvements above mentioned; that is, the heating rollers (in the distillation of gas from coal or other material) by placing them in contact with, and surrounded by, the fuel, without the aid of a high chimney or other means of obtaining a violent draft; also the means of purifying gas; and the means of aiding the operation by an apparatus for producing a vacuum, thereby avoiding the pressure otherwise consequent on the retorts and other parts of the apparatus when used in the ordinary manner.

[*Rep. Pat. Inv.*

To Jacob Perkins, *Engineer, for an improvement in Preserving Copper, in certain cases, from the oxidation caused by heat. Sealed November* 20, 1832.

The invention relates to the preservation of the copper tubes used in steam boilers, particularly such as are now employed on the Liverpool and Manchester rail-roads; in which boilers, the flues from the fire-box, or furnace, consist of a number of small copper tubes, through which the heat, fumes, and vapours, pass to the chimney, and it has been found that these tubes become quickly destroyed by oxidation. The patentee states that his improvement consists in coating the parts of such copper tubes directly acted on by the heat with an alloy, or mixture of copper and zinc, by which means such copper tubes will be greatly preserved from the effects of oxidation produced by heat; and he then describes the means which he uses for coating such tubes, either on the outer or the inner sides; and although he has particularly mentioned the tubes used in boilers similar to those employed on the Manchester and Liverpool rail-roads, which have their

inner surfaces exposed to the action of the heat and vapours arising from the furnace, yet the same effect will be produced in coating tubes on their outer surfaces, when they are used in boilers which have the water on the inside, and the fire acting on the outer surfaces. He mixes about two-thirds of copper with one-third of zinc, by melting, (these being the proportions he prefers;) but he does not confine himself thereto, as the same may be varied.

With this mixture he coats the surfaces which are to be directly acted on by the heat and vapours, by bringing the surfaces, whether the exterior or interior surface, so to be coated, in contact with a quantity of the melted alloy aforesaid, and keeping them in contact till the melted metals or alloy adhere all over those surfaces of the copper tubes which are to be directly acted on by the heat; or this coating may be effected in a similar manner as is practiced in joining the two edges of the copper in making the copper tubes, taking especial care that there is a thin coating over every part of that surface of the tube which is to be directly acted on by the heat.

The patentee states, that he claims as his invention, the coating copper tubes in steam boilers with a mixture, or an alloy, of copper and zinc, as above described, and thus greatly preserving them from oxidation caused by heat. *Lond. Jour.*

¶ List of French Patents.

A List of Patents for Inventions, Improvements, and the introduction of Foreign Inventions or Improvements, granted in France during the first quarter of the year 1832.*

[TRANSLATED FOR THIS JOURNAL.]

(Continued from p. 199.)

Madame Gerin, (Widow,) Son & Co., merchants, St. Stephens, Department of Loire, February 22nd, 1832, (10 years,) a new species of fire arms. (P. Invent.)

John Goff, of London, represented at Paris by M. de Moleon, March 26th, 1832, (10 years,) an improved apparatus for filtering water. (P. Invent. and Improv.)

Peter Hugues, lawyer, Bordeaux, department of Gironde, February 20th, 1832, (5 years.) A machine for sowing grain, called "the Hugues' Sower." (P. Invent.)

John Francis Hulot, Paris, March 9th, 1832. An eatable, called Racahout, made from the palamont of Turkey, which corresponds to our acorn. (P. Improv.)

Abraham Emanuel Jaccond, mechanician of Vienna, residing

* In the following list P. Invent. denotes a patent for an invention. P. Invent. and Improv. a patent for invention and improvement. P. Improv. a patent for an improvement. P. Import. a patent for the importation, or introduction of a foreign invention. P. Import. Improv. a patent for introduction and improvement. P. Invent. Import. a patent for invention and importation.

with M. Bert, merchant, Lyons, department of the Rhone, February 11th, 1832, (10 years.) Method of making wheel-stocks, axles, sockets, pins, &c. applicable to all kinds of wheels, having the advantage of containing within each the oil required to lubricate it. (P. Improv)

Amable Jay, hatmaker, Paris, January 14th, 1832, (5 years.) The use of caoutchouc in the manufacture of hats. (P. Invent and Improv.)

John Lachaise, senr., merchant taylor, at Grandis, district of Villa Franca, department of the Rhone, January 23d, 1832, (5 years.) A process for cutting coats. (P. Invent.)

De Lancry and Charry, Paris, February 20th, 1832, (5 years.) A musket or fowling piece firing twice from the same barrel, and with but one vent or touch-hole. (P. Improv.)

Felix Leaubereau, merchant, Paris, February 20th, 1832, (15 years.) A manometric lamp, with a double wick and draught, and two receivers. (P. Improv.)

Charles B. Lehody, watchmaker, Paris, March 9th, 1832, (5 years.) Improvement in the manufacture of pendulums. (P. Invent.)

Alexander Edward Lemolt, magistrate, Paris, March 28th, 1832, (10 years.) Therapeutic method of electrical friction, and the requisite apparatus, called the electrical brush. (P. Invent. and Improv.)

G. and I. Louvet, of Peronne, residing in Paris, January 31st, 1832, (10 years.) An improved apparatus for boiling beet juice. (P. Improv.)

Philip Maihieu, Gent., Lyons, department of the Rhone. A new percussion gun and pistol. (P. Invent. Improv.)

George Louis May, Paris, January 27th, 1832, (10 years.) Method of making strong beer by steam process. (P. Invent.)

Mention and Wagner, jewellers, represented in Paris by M. Traffaut, March 14th, 1832, (5 years.) Process for making black enamel, for printing the designs engraved upon plates of all dimensions, and for applying enamel to certain metals. (P. Improv.)

Stephen G. Merckel, Paris, February 11th and 28th March, 1832, (15 years.) *Phlogosaide* matches. (P. Invent.)

F. Meugnot de Nansouty, represented by Madame de Nausouty, Dijon (Cote d'Or,) March 26th, 1832, (5 years.) Method of manufacturing plough shares of rolled iron. (P. Invent.)

F. M. Mignard Billinge, machine maker, Belleville, near Paris, February 11, 1832, (10 years.) A machine for opening oysters. (P. Invent.)

Toussaint L. J. Milan, senr., tin-lamp maker, Paris, March 7th, 1832, (15 years.) Several fixtures to facilitate and simplify the use of hanging lamps. (P. Invent.)

Andrew Millet, constructor of fireplaces, Paris, January 9th, and 26th March, 1832, (10 years.) Portable metal fixtures for fireplaces, by means of which the fire is brought out from the chimney. (P. Improv.)

Thomas M. Motte-Falisse, watchmaker, Paris, March 9th, 1832. New system of percussion applicable to fire arms. (P. Import.)

Nereé-Tellier, goldsmith, Paris, March 28th, 1832, (10 years.) New carriage, with *Tellier* springs. (P. Improv.)

Peter Olagnon, machine maker, St. Stephens, department of the Loire, March 26th, 1832, (5 years.) Loom for the manufacture of ribbon or other articles of any size. (P. Invent. Improv.)

Madame Payene, manufacturer, Sedan, department of Ardennes, March 31st, 1832, (5 years.) A water for bleaching linen, called "blue of roses." (P. Invent.)

John P. Pernot, represented at Paris by M. Lambert, Royal Conservatory of Arts and Manufactures, January 23d, 1832, (5 years.) Articles of straw of different colours glued upon stuffs and intended to make hats, to replace hangings, and which may be combined so as to form designs upon wood. (P. Invent.)

Bartholomew Perrin, Paris. A simple apparatus, which he calls *autopiese*, for uniting and separating instantaneously several small objects, and of changing or continuing their direction. (P. Invent.)

Charles Phillippe, of Brussels, represented at Paris by Eugene Phillippe, February 20th, 1832, (10 years.) A machine for making pins. (P. Invent. and Improv.)

Peter Andrew Piquenot, ribbon and suspender manufacturer, Paris, March 26th, 1832. For the manufacture of net-work suspenders, with button holes without stitching. (P. Invent. and Improv.)

Stephen Plantvignes, merchant, Bordeaux, department of Gironde. For a *Marine Rail-way* for hauling up vessels, and for overcoming lifts, by the use of metallic balls, of rollers, and of iron wheels and axles. (P. Invent. Improv.)

Louis Basilde Sulpicius Poissant, and Besnier Duchaussais, resident at Courcelles-les-Mezerolles, department of Somme, January 26th, and March 28th, 1832, (each 10 years.) New and economical process for kneading and baking bread. (P. Invent and P. Improv.)

Philip Querini, merchant, Paris, January 9th, 1832, (5 years.) Mode of manufacturing paste-board and paper of straw, and of whitening the same. (P. Invent. Import. Improv.)

John Anthony Raymond, merchant, Paris, February 14th, 1832, (15 years.) A metallic tongue, to be used with or without glue, and proof against moisture, for joining different articles. (P. Improv.)

Constantine Lewis Rolland de Blomac, Carcassone, department of Aude, March 28, 1832, (15 years.) Method of increasing tenfold the value of the marc of grapes. (P. Invent.)

Rollé and Schwilgué, mechanists of Strasburg, Lower Rhine, January 26th, 1832, (10 years.) Hydraulic weighing machine, for weighing loaded carriages. (P. Improv.)

Rollé and Schwilgué, mechanists of Strasburg, January 31st, 1832, (10 years.) Household weighing machine. (P. Invent.)

Peter Isidore Rouen, Paris, February 29th, 1832, (10 years.) Hydraulic regulator of the flow and action of liquids and gases. (P. Improv.)

Louis Roussel, manufacturer of domestic sugar, Lespine, arron-

disment of Avesne, January 23rd, 1832, (5 years,) and 26th March, 1832, (5 years.) Mode of extracting the last portion of sugar from the beet. (P. Invent. and Improv.)

Louis Joseph Salmon, manufacturer, Paris, January 27th, 1832, (15 years.) New manure. (P. Invent.)

Claude Francis Sigonney, shoemaker, Paris, March 28th, 1832, (5 years.) Economical stove for cooking, and heating apartments. (P. Invent.)

John Marie Souchon, chemist, Paris, March 28th, 1832, (15 years.) Method of dyeing with prussian blue and other substances. (P. Invent. Improv.)

Maurice Louis Steinau, of Berlin, residing at Paris, January 24th, 1832, (15 years.) New manure. (P. Invent.)

Augustus William Tampier, Bordeaux, department of Gironde, March 14th, 1832, (5 years.) *French* system of penmanship. (P. Invent. Improv.)

Thilorier and Serrurot, Paris, March 9th, 1832, (15 years.) Hydrostatic lamp with an interior reservoir, to be used instead of the *Carcel* lamp, and having no wheel work connected with it. (P. Improv.)

Andrew Stephen Trompette, Paris, January 27th, 1832, (10 years.) New method of hanging carriage bodies. (P. Improv.)

Tschaffen and de Kees, Vienna, represented at Paris by M. Risler, January 27th, 1832, (5 years.) Machine called a turning press, for making plates, or other articles of the same sort of silver, tin, copper, &c. (P. Import.)

George Hippolyte Viel, watchmaker, Paris, February 21st, 1832, (5 years.) Improvement in mantel time pieces. (P. Invent. Improv.)

John Marie Vouret, mechanist, of Louviers, residing at Paris, January 23d, 1832, (10 years.) Machine for ploughing and harrowing. (P. Invent.)

Recapitulation.—During the 1st quarter of 1832, there have been issued, in France, ninety patents.

¶ *On the application of Steam, expansively, in Cornish Steam Engines.*

By E. Galloway, Esq., Civil Engineer.

[Continued from p. 277.]

It was not till 1804 that high steam was used expansively. In that year Mr. Arthur Wolf obtained a patent for an alleged property possessed by steam. He assumed that steam of a force equal to any number of pounds above atmospheric pressure, would expand itself the same number of times its volume; and, supposing no waste of caloric by radiation, would still retain an elastic force equal to that of the atmosphere. He states that he had proved by experiment, that steam of forty pounds on the square inch, would expand itself to forty

times its volume, and yet equal the elastic force of the atmosphere.* There is, however now no law which is better understood than that of the expansion of elastic fluids; and it is certain, that if no change of temperature take place, the space occupied is inversely as the pressure. It would have been singular if the ratio of expansion had commenced at the temperature at which the steam balances the pressure of our atmosphere, which pressure is variable, not only from the changes of weather, but with the altitude. Mr. Wolf was not aware that fluids obey the same laws, and are not dependant on each other for the ratios of their expansion. Water commences to expand itself into steam at a certain temperature, and above that temperature its ratio of expansion is regular. The atmospheric pressure is a deduction from its effect, because it acts as a counterbalance: if removed, or, which is the same thing, if the steam be allowed to expand in vacuo, it is evident it must obey the common laws of expansion to which fluids are subject: hence it commences to expand not at 212 degrees as Wolf supposes, but at 40 degrees. Steam of forty pounds is really equal to more than fifty-four pounds; that is, the atmospheric column $\times 40 =$ to about 54; and this, instead of expanding itself forty times, cannot expand itself four times without being reduced below atmospheric pressure.

The expansive property of steam is strictly mechanical and common to all fluids. It simply consists in this, that vapour, of a given elastic force, will expand itself to certain limits; and during the process of expansion, will act on opposing bodies with a force gradually decreasing until it has reached the limits of its expansive force, or is counterbalanced by the resistance of a surrounding medium. If air, for example, be compressed in a close vessel, and suffered to act on a piston, it will give motion to the piston with a decreasing effort, until (supposing the absence of friction) the air in the vessel be in equilibrio with the surrounding atmosphere. In like manner, steam of high elastic force, being permitted to actuate a piston during a portion of its stroke in a cylinder, and afterwards the communication which admitted it being closed, will expand itself until counterbalanced by the atmosphere. But, if a partial vacuum be formed on the other side of the piston, its motion will then be continued until its density be as low as that of the uncondensed vapour on the opposite side of the piston. It is clear that the power which may be obtained by thus impelling a piston, is as the mean between the highest and lowest pressure on the piston.

* Mr. Tilloch tried the experiments in conjunction with Mr. Wolf, by which the latter was led to conclude, that the expansive power of steam was in the ratio of its density in pounds *above the atmospheric pressure*. They used in the experiments two vessels, whose capacity were proportionate to the anticipated expansive power, and found that an elevated column of mercury was restored to equilibrium when the steam was admitted into the larger vessel. This experiment, however, is evidently imperfect, since equilibrium might have been restored by leakage, or other causes. The expanded steam should have been made to *sustain* a column of mercury before any result to be relied on could be obtained.

It will be well understood, that it is saving, and not gain, that thus results: a power being made use of which was before lost. For, referring to the example of compressed air, it is true that, if the air be condensed so as to equal twenty pounds on the square inch, and the supply be continued throughout the stroke, an impulse could be given to a piston equal to twenty pounds per square inch, during its whole stroke; whilst, if it be cut off at a portion of the stroke, and allowed to expand itself, the impulse would be only as the mean = 10 lbs.; but it is evident that, in the former case, we suffer the air to escape from the cylinder at the same elasticity as it entered, and lose the whole of the force which was necessary to compress it to its density; while by expanding it to its limits, we lose no part of that force.

The main-spring of a watch actuates its machinery in this manner: an increasing effort is required to wind up the spring, and a decreasing impulse is given back to the machinery. This is so regulated, however, by the fusee on which it acts, as to give a regular motion. Now, if after the spring had partially uncoiled itself, it were then liberated, and allowed to do so completely, the force which wound it up to its last impelling point would be totally lost.

So in the steam engine, a certain quantity of fuel is required to raise steam to a certain elasticity; if, then, the steam be allowed (after moving the piston) to escape into the atmosphere without having acted expansively, the fuel which was consumed to raise it up to that elasticity, will have been principally lost. In the one case, a given bulk of fuel would produce forty, in the other, would produce 0; that is, 40, + 39, + 38, + 37, &c. &c.

It is easy to see by this, that the advantages arising from expansion, increase with the density of the steam; for steam of 50 lbs. per square inch above the atmosphere being = 64, and steam of 10 lbs. above the atmosphere being = 24; we have in the one case a mean effect of twelve acting through twenty-four of space; and on the other a mean of thirty-two acting through sixty-four of space, whilst the fuel consumed is nearly as the respective densities of the steam; ergo, steam of 50 = 64 lbs. gives a mean pressure of 32, expanding to 64 times the original bulk, before it reaches the limits of its expansive power; hence $32 \times 64 = 2048$. But steam of 10 = 24 lbs. gives a mean pressure of 12, expanding 24 times its original bulk before it reaches the limits of its expansive power; hence $12 \times 24 = 288$. In round numbers 64 of steam performs more than seven times the duty of 24 of steam; being in favour of the higher steam nearly as 3 : 1.

It is not difficult to ascertain the extent of saving over the Boulton & Watt engines, effected at Wheal Towan, when the law of expansion is perfectly understood. The pressure of steam in the boiler is regulated to 35 lbs. on the square inch; but this, by wire drawing in the passages, is reduced in the cylinder to about 27 lbs. above the atmospheric pressure=41 lbs. which, cut off at one-fourth of the stroke, will expand itself to five pounds above vacuum, and give a mean impelling effort to the piston of 23½ lbs. Steam of six lbs. on the inch, is, by wire drawing on the passages, generally reduced from one to four pounds on the inch: taking 2 lbs. + 14, as an average of the

effective pressure in the Boulton & Watt engines admitted during the whole stroke, we obtain an impelling effort of 16 lbs.

The fuel consumed being supposed in the ratio of the pressure of the steam above a vacuum, we obtain the following results:

49 of steam × 25	parts of the stroke	= 12	performs a duty of	$23\frac{1}{2}$
20 of steam × 1	,,	= 20	,,	16

the advantage being in favour of the high steam as 38 : 16.

The result in practice falls short of this in both cases, from leakage and other causes, but as these are common to both systems, I have made no deductions from either.

4th. *Covering, or "clothing," the boiler, steam pipes, steam chests, and cylinder, with a nonconducting substance, to prevent the radiation of heat.*

This, in many of the Cornish engines, is so effectually done, that the heat in the engine room does not materially affect the thermometer. The radiation from the boiler is also, in many cases, scarcely perceptible. The merit of using clothing so effectually, and indeed its first application with any useful result, is due to Capt. Samuel Grose, on whose plans the engines at Wheal Towan are constructed, whose elegant arrangements of machinery, and accuracy of proportions, have enabled him to outstrip all his competitors. Since the year 1825, the period at which he erected his first engine, his improvements have increased the duty of a bushel of coals on the average, throughout the country, forty per cent., and in individual cases, more than two hundred per cent.

The value of the advantages of clothing is variously estimated, nor am I aware that any experiments have been made of sufficient extent and accuracy to be relied on. Mr. R. W. Fox, of Falmouth, tried some experiments, and found that a slight covering of paint over his steam vessel, effected a saving of one-fifth. Mr. Grose's method of clothing, however, may be said to be as perfect as is attainable, and its application at Wheal Hope, without any other material alteration, increased the duty of one bushel of coals from 40 to 70 millions. Of this fact I have been assured by various disinterested parties, although it is asserted by other engineers that the advantage of clothing does not exceed an increase in the duty of one-fifth or one-fourth. I am, however, convinced that the improvement at Wheal Hope is always attainable where the clothing is effectively applied.

5th. *Suspending the action of the piston at the completion of the stroke, to allow time for the perfect condensation of the steam in the cylinder.*

The increase of effect produced by this improvement is considerable, as the superior efficiency of engines for drawing water is dependant upon their power being greatest at the commencement of the lifting stroke, where more power is necessary to overcome the vis inertiæ of the matter raised, than to continue its motion. I have found that the best engines on the Boulton & Watt principle, make about one-fourth of a stroke before condensation is completed; and assuming that in the Wheal Towan engine the same time would be required, the mean decrease of effect would be 7 lbs. × 25 parts of the

stroke, which, being deducted from $23\frac{1}{2}$ lbs. (the mean pressure on the piston during the whole stroke,) would amount to a loss of nearly one-tenth of the whole effect.

From the preceding investigation we shall be able to ascertain, tolerably nearly, the increase of duty assignable to each of the Cornish improvements.

Boulton & Watt's engines perform an average duty of raising 19,800,000 lbs. one foot high, with one bushel of coal.

As in the Wheal Towan boilers, one bushel of coal converts 13.824 cubic feet of water into steam, at atmospheric pressure, while the Boulton & Watt engine boiler rarely converts more than eight cubic feet into steam of similar elasticity, we have an increase of duty from the boiler alone as 13.824 : 8, which on 19.800.000 is equivalent to a duty of raising one foot high . . . 34.214.400 lbs.

Increase of duty by using steam of 35 lbs. in the boiler, equal to 27 lbs. in the cylinder + 14 lbs. pressure above vacuum × .25 parts of the stroke = 12.25 composed of steam of six lbs. in the boiler, equal to two lbs. in the cylinder + 14 lbs. pressure above vacuum × the whole stroke = 20; 12.25 producing a mean pressure of $23\frac{1}{2}$ lbs.; and 20 a pressure of only 16 lbs., which gives an increase on 34.214.400 = . . . 47.044.800

Increase of duty by the application of clothing, three-sevenths of the whole duty of 81.259.200 lbs. 34.125.371

Increase of duty by obtaining a more perfect vacuum at the commencement of the lifting stroke, by suspending the motion of the piston until the steam is condensed, equal to one-tenth of the whole duty, 11.608.457

Total duty of one bushel of coal, . 127.693.028

I am aware that more accurate experiments may detect errors in the proportion of duty I have assigned to each of these improvements; respecting the real amount of duty, and the cause of the increase, however, there can be no doubt, nor do I anticipate that my proportions will greatly vary from the truth. I have, as I said before, made no allowances for losses by leakage, or imperfect vacuum, which, being common to both, would most affect the lesser performance. I am anxious not to overrate the advantages, and have not, therefore, included the saving of fuel stated by M. Clement to be obtained simply by the generation of higher steam, as the consumption of fuel does not, he states, increase in the ratio of the elasticity. The accuracy of his experiments are, however, doubted by others, and I have therefore rejected them.

[*Rep. Pat. Inv.*

¶ *Report of Messrs. Walker and Burges, Civil Engineers, on the state of Blackfriars Bridge.*

(Concluded from page 286.)

Alteration in Level of Cutwater.—We propose that the finish of the cutwater, which forms the foundation on which the columns stand, should be raised two feet eight inches, the present low level having been the cause of the decay near the bases, which we have referred to; this will be the more necessary when the addition to the rise of the tides is considered. The columns, we have no doubt, originally stood level with the high water of spring tides, and they are so shown on the engraved elevations; but the standard of ordinary spring tides, as fixed by the Trinity House in 1800, is ten inches on the average above the foot of the columns, so that, the London Bridge dam being removed, the bases are now generally covered with water at spring tides. We think that the alteration will improve the appearance of the columns; and as this is the only point of consequence in which we have interfered with the architecture of the bridge, (having studiously avoided doing so,) we have had one drawing prepared with the columns as they now are, and another showing the proposed alteration, and by them we are confirmed in this opinion. We recommend shortening the columns without lessening their diameters: their present height is in no case less than ten diameters, which is greater by one diameter than the height usually assigned to the Ionic order. If there is any case in which a deviation from strict rule, so as to give the appearance of greater strength, is allowable, it is in bridge architecture; but, fortunately, we do not require to use any license on the present occasion.

Architraves and Balustrade.—The architraves over the columns are also proposed to be renewed. The balustrade, or parapet, requires to be noticed more particularly: it is at present in a very dilapidated condition, a great number of the balustrades being broken or otherwise injured, and the capping in a very bad state. Having paid great attention to this point, we do not see any way so effectually, and, on the whole, so economical, as having new balusters for the lower or east side of the bridge, and transferring the soundest of the present ones to make good the deficiency on the west side. New capping of good stone is proposed for both sides, and as the base on which the balusters stand must be repaired and reworked, we propose to reduce its height about three inches, which will take off the defective parts of the stone, and make the balustrade of a better level as respects the view of the river than it now is.

Arch Stones.—The broken and defective arch stones, which have been measured one by one, are all to be taken out, and replaced with new; the whole of the facing and soffits of the arches thoroughly cleaned, the joints pointed with pozzolano mortar, and generally, in addition to what has been stated, every part of the bridge is to be thoroughly repaired, as is particularly described in the specification.

Lowering Causeways.—We have included, also, the lowering of

the causeway on both sides of the river, and the ground under three of the arches on the city side, and one arch on the Surry side. The increase which will thus be given to the water way will be an improvement, and the cost trifling, as the material is proper for ballast.

Foot Paving.—The foot paving of the east side is proposed to be of new granite; that of the west to be made good with the best of the present stone taken from both sides.

Stairs.—The steps of the watermen's stairs are all to be of new granite; a few of the steps are at present granite, which will do to be used again near the bottom.

Estimate—The estimate of all the works contained in the specification amounts to the sum of £58.305, which includes an allowance of fifteen per cent. for contingent expenses and superintendence.

Change of Bed of River.—On comparing the bed of the river, as shown by the engraved elevation, with the present levels, a great difference is observable, particularly on the city side. The low water mark, which appears to have reached the middle of the first arch on this side, does not now go much beyond the middle of the third arch. Round the second pier, there is shown a depth of eight feet at low water: it is now dry, and there is nearly the same difference in the level of the ground round the first pier. The variation is less towards the middle of the river, and on the Surry side there is not much change; if any, the depth appears to have increased. But the most important difference, as affecting the stability of the piers, is near their *shoulders*, compared with the present depths in the line of the *middle*, particularly of the four piers on the south of the fourth arch, from the city side. There is little doubt of the ground having been left at least as high at the ends and shoulders of the piers as in the middle. Beginning at the fourth pier from the city side, or the Middlesex pier of the centre arch, the ground towards the middle of the pier, is six feet above the tops of the bearing piles, or bottom of the caisson. Near the upper, or west, end of the same pier it is generally only two feet above the piles, and for six feet in width it is actually below the tops of the piles, and has washed from under the bottom to a depth of eighteen inches; so that a boat hook could be thrust five feet under the caisson bottom, of which this angle is therefore entirely unsupported, except by one or two bearing piles. Near the lower or east end of the same pier, it is, on the average, only two feet above the piles, or level with the top of the timber platforms. The levels and differences of the Surry pier of the centre arch are similar to the one we have described. At the sixth pier from the Middlesex. or third from the Surry side, the ground is from two to four feet lower towards the ends than at the middle; the average level towards the ends being only one foot above the piles at the west end, and from two feet to two feet six inches at the lower end. At the ends of the second pier from the Surry side the ground is from two to two feet six inches lower than in the middle, and only one foot to eighteen inches above the bearing piles.

Effects of Removal of London Bridge.—We had no information to guide us as to the section of the ground previously to the removal of

London Bridge; but there is little doubt that the additional scour thereby caused has been the principal, if not the only, cause of the deepening at the piers. As we consider that the bridge would not be secure if an increase of scour were to remove more of the ground from the foundations, we explained the facts and our opinion to the chairman of the committee, who considered that it would be desirable to have a survey and report on the probable effect which the entire removal of the dam formed by the piers of the old bridge would produce on Blackfriars Bridge, and the means we should advise to secure the foundations completely, with reference to such removal. We have, therefore, bored the bed of the river near the site of the piers, in order to ascertain the level of the clay; because if the caisson bottoms had been founded upon the bed of London clay, the danger of undermining would have been much less. The result has proved that the caissons do not rest on the clay, but that in the piers where clay has been found, a stratum of gravel, varying from eighteen inches to four feet, is interposed between it and the bottoms.

Shoot through London Bridge.—We have also made a series of observations on the fall, or shoot, at old London Bridge, with a view to ascertain its present extent, compared with what it was before any part of the obstruction was removed, that we might thereby form a judgment if the scour through Blackfriars Bridge is likely to be increased. The average of our observations gives a fall from Old Swan Stairs to Billingsgate of two feet four inches at the low water of spring tides. On reference to the table of tides, taken under the direction of Mr. James Montague, in 1820 and 1823, we find that a fall of a similar tide was four feet four inches. The difference, therefore, is already lessened two feet; but we think that the entire removal of the old bridge, and the shoals near it, will reduce the present shoot of twenty-eight inches to four inches; or, in other words, that the water above the bridge, already fallen two feet, will fall two feet more, and that the velocity and scour through Blackfriars Bridge will be much increased. The direct effect of this will be still more to undermine the bridge, unless effectual means be taken to prevent it; and it would, in our opinion, be imprudent to expend a large sum in the repair of the superstructure without properly securing the foundations so as to be prepared for the circumstances we have stated.

Securing Foundations.—The plan we would propose for this purpose is to drive a complete row of close piles, twelve inches thick and thirteen feet long, with guide piles, and walls round five of the piers, the heads being level with the top of the caisson bottoms, and to build up the spaces between the piles and the piers solidly with stone laid to a proper slope. In whatever way this is executed, the operation will be tedious and expensive; but when properly done, the work will be secure against almost any contingency. One of the modes which may be adopted is that used at Westminster Bridge, which is to drive the piles in the water, and afterwards cut off the heads to the proper level in the diving bell, and to do the masonry also by the bell. We have prepared an estimate of this, and make the expenses £23966, including contingencies, &c., as before, which, with the sum already

stated for the other repairs, makes a total amount of £82,271. But the most effectual plan is undoubtedly by means of coffre-dams, as they will, at the same time, give an opportunity of examining every part of the foundation, and enable the stone work between high and low water to be done in the dry, which is both better and cheaper than in the tide. The amount of dams and piling for the five piers, allowing a deduction for the difference of labour in the masonry, is £30,625, making, with the general repairs, a total of £88,930.

Estimates.—The worst features of the above are probably the large amounts of the estimated repairs; but to do the works properly, they are, we believe, unavoidable. The quantities are all from detailed measurements, and the prices from considerable experience in works and estimates of this nature. There is one exception as to the certainty of accuracy, and that is the cost of the work done in the diving bell, to which so many contingencies are attached that it cannot, either as to time or expense, be estimated with correctness. We have in this case taken the prices of work done within coffre dams as a basis, and added to them for the risk and difficulty of the work done by the diving bell.

Time.—Our opinion is, that the repairs from low water upwards, which are stated in the first part of this report, may be completed in from two and a half to three years, and that if the coffre dam plan be adopted, the works of the foundations and superstructure may both be done in three years; but if the diving bell be used, the time is, we have said, very uncertain.

Necessity of immediate measures of security.—We have stated that no time should be lost in defending the bridge against accident, and when the present unprotected condition of part of the foundations, arising from the changes at London Bridge, is considered, there can be little doubt of the necessity of making the securing of the foundations keep pace with, or rather precede, the further removal of the dam formed by the remaining piers for the old bridge, and the shoal under it. On inquiry, we learn that the latter work is to be completed in the course of the present year;* to place Blackfriars Bridge out of danger, two, at least, of the piers ought to be secured, if possible, during the same time.

Abstract.—Our opinion on the important points referred to in this report may therefore be summed up in the following abstract:—

	£	s	d
The cost of the repairs above low water, will amount, in round numbers, to . . .	60,000	0	0
The piling, and otherwise securing the foundatians; done in coffre dams, to . .	30,000	0	0
Making together . . .	90,000	0	0

But, whether as respects the security of the superstructure, or the foundations, or the safety of passengers under and over the bridge,

* The Chairman of the London Bridge Committee informs us six months.

the work of repairing either ought by no means to be delayed; no prudent man would, we think, like to take on him the responsibility of the bridge in its present state for any time.

JAS. WALKER,
A. BURGES.

The substance of a Lecture on the practical prevention of Dry Rot in Timber; delivered by Prof. FARADAY, *at the Royal Institution of Great Britain, February* 22, 1833.

Professor Faraday commenced by repeating a remark, that what was most elaborate in nature, was that which soonest runs to decay. It fell to his lot to bring before the members of the Royal Institution one of those instances of decay, in which nature seemed to have deprived mankind of the benefits which she at first appeared disposed to promise, by shortening the duration of its enjoyment, But, in bringing forward the prevention of dry rot, he had no right to claim it as *his* subject, it being dependant on a process invented by Mr. Kyan, or, in stricter terms, improved by him; and he begged to say the meeting was indebted to the exertions and liberality of some of its members for the various illustrations before them.

With regard to decay in general, and to that of wood in particular, which gives rise to the destruction now to be guarded against, it was hardly possible to say any thing definite as to the cause of that decay, for it seemed to him that cause and effect almost replaced each other; that is, what was a consequence at one time, was at other times a cause of the final ruin of those fibrous matters which are used for domestic purposes. On reference to the different specimens around him, instances would be seen of rapid and extensive decay, which it is the object of the process he had to bring before them to prevent. For instance, said Prof. F., here is exhibited a beam of wood, in which the one part is rapidly passing to decay, and the other part is sound, or nearly so. There is a piece of wood on the table, made into a thin plank, and laid over the internal wood-work. It has been painted outside, and appeared to the eye to be good, but, after a short time, the rot caused it to decay; the rot had run from the interior to within the twentieth part of an inch of the paint, which, aided by the air and light, had stopped its progress. Prof. Faraday showed another specimen, which had been sent to him by Prof. Burnett, of the results of the same kind of decay, or what is called the dry rot fungus. It was the most magnificent he had ever seen, and was formed in a sort of gutter or wooden trough across a large room, the conservatory of his Grace the Duke of Norfolk. The fungus had prospered so much, that even its fructification was fully developed. Those who might wish to examine it closely, would see that the plant was extending itself from place to place, and producing here and there aggregations of seed vessels consistent with its organic arrangements. Another specimen, was a case of decay from animal operations, which had been going on at Woolwich; it was taken from a large mass of timber, so

penetrated by the worm, that it appeared to be like a piece of sponge. There was another piece similarly circumstanced, which had been a part of one of the timbers belonging to Brighton Pier. It, in the first instance, had been fifteen inches square, before being placed under water; and it was wonderful to observe how, by decay and the action of various insects, it had been brought to its present state. Another specimen was part of a mast of a vessel, which, though to appearance sound on the outside, was in the inside gone as if it had been hollowed out by a workman's tool; the decay had taken away the strength of the mast.

Wishing to obtain a clear notion of the subject, he, Professor Faraday, went a short time before to Woolwich, to ascertain what was proceeding under the sanction, or by order of, the Admiralty. He took an opportunity of going on board a frigate, the Thalia, to see the state of the timber that had been used in the construction of a vessel that was intended to hold hundreds of men. Reference might be made to one or two cases of decay on record with regard to such vessels, and the facts appear most extraordinary when we are led to consider what an enormous expense had been incurred from that cause. He understood, (and all that knowledge which was not purely chemical, he had obtained from others,) that, in the construction of vessels in the navy, the proportion of wood consumed was about as follows:—A first-rate, carrying ninety guns or upwards, consumed in her construction 5,880 loads of timber; a second rate, or eighty-gun ship, of which a model as regards the hull was on the table, consumed 4,339 loads; a third rate, or seventy-gun ship, consumed 3,600; a fourth rate, 2,372; a fifth rate, 1,800; a sixth rate, or twenty-eight-gun ship, 963 loads. Now, when they heard such statements as he would read from the Quarterly Review, for 1813, it would give those who have not attended to the subject, some idea of the importance of the present inquiry. The Rodney was launched in 1809; she had scarcely put to sea, when, owing to the unseasoned state of her timber, all her fastenings became loose, and it was necessary to bring her home from the Mediterranean in 1812, to be paid off. The next example was a very serious one; it was that of the Dublin. That ship was launched in February, 1812, put into commission in the following August, sent upon a cruise towards Madeira and the Western Islands in December, from which she returned to Plymouth, in 1813, in so dreadful a state that she was ordered to be paid off. She has since been repaired at an expense not much less, it is stated, than £20,000. Cases could be mentioned of ships in private dockyards, which had scarcely been at sea before they were knocked up and sold as wood for fuel or other purposes, in consequence of the dry rot having taken possession of them; and it could even be shown that quantities of timber which had been stacked up for seasoning, a process occupying from two or three, to four or five years, had actually gone to decay, while they were in seasoning, before they had been brought into use.

Circumstances like these have induced various persons to search for different remedies for the dry rot, and many processes have been

devised. Government has from time to time been pestered, it may be said, by different inventors who have failed to obtain the end in a desirable and perfect manner. Prof. Faraday said it was not his object to take into review those various processes; he had always considered that a process intended to be applied in a large way for useful purposes must be tried before an opinion was given on it. The importance of the subject was such, that government have always paid that fair attention to such applications as would induce them to try the remedies proposed, if they came justified by sufficient evidence to deserve the tribute of praise, upon which the trials were called for. He might dispose of all these, because, having been tried fairly, and having failed, it was presumed the trials had not led to any final application. He should take up only that one which he had considered (as far as its chemical principles were concerned, and as far as it was connected with the case,) and thought *to be borne out by the previous knowledge of the substance used, as being sufficient for the purpose proposed; requiring only to be tried to justify the full assurance of its use.* The process he had to lay before them depended upon the application of an anti-destructive, which had been long known as a very active body in all such cases, namely, corrosive sublimate; for every anatomist, and every visiter of an anatomical museum knows that corrosive sublimate was, and is, used from time to time to prevent the decay of the most delicate organic tissues and parts, even such things as the brain itself, which are liable to putrescence; and by the application of this metallic preparation, they can be prevented from going to decay, and be preserved for any length of time.

A gentleman of the name of Kyan, considering the property of corrosive sublimate, proposed to apply it to timber for the prevention of the dry rot; that is, in cases of decay, whether they arise from the action of the seeds of cryptogamous plants, vegetating in the wood, or from the presence of the albuminous parts of the tree. Mr. Kyan thought the evil might be stopped; that the commencement even might be prevented by the application of corrosive sublimate, in consequence of the chemical combination which takes place between the corrosive sublimate and those albuminous particles, which Berzelius and others of the highest authority, consider to exist in and form the essence of wood; which being the first parts that run to decay, cause others to decay with them. Mr. Kyan's conviction was such that he went to the Admiralty to place it before them. They required certain trials to prove the soundness of the application, which trials he (Prof. F.) would now have to bring forward. After these were carried on for two or three years, the Admiralty advised Mr. Kyan to take out a patent; and were still engaged in watching the progress of these trials since that period.

He would now tell them how it was proposed to prepare timber, and what were the results. The proposition was to soak the timber itself in a solution of corrosive sublimate. Prof. F. then showed the model of what is termed a tank, in which the timber is to be immersed in the solution. He said that the meeting must not be struck with

the name of that which a few years ago was rather expensive, but now a cheap application, for a pound of it did not cost *much in proportion to the good that would ensue, which he* (Prof. Faraday) *thought would be fully confirmed by the result after a few years' experience.* This being done, the timber is dried, and said to be prepared; it has been applied by Sir Robert Smirke to the new buildings in the Temple, and has been tested in a very extraordinary way, of which some account will now be given.

Besides the application of corrosive sublimate to timber, it has been applied to various fabrics not composed of wood, as, for instance, canvass, cottons, tows, and hemp, to prevent their decay. Before him were some of the pieces submitted to trial by order of the Admiralty, three years ago, in the fungus pit at Woolwich, which he (Prof. Faraday) went the other day to see opened. It was a pit dug in the yard, and enclosed by wood on all sides, having a double wooden cover; it was damp of itself, and into this were put various kinds of wood of which they wished to make trial. One specimen was a piece of timber which came out at the end of three years as sound as it went in; but the unprepared timber had decayed up to the very joint. No part of it had been left, it had decayed and become rotten throughout, but the piece before them was left whole and sound, and fit for the construction of vessels. Last week he saw a large cube of wood which had been there first for three years; it was taken out, examined, and put in for two years more, altogether making five years. That cube of wood was again taken out and examined by him on Tuesday, the 19th of February; it was hard and sound. *There was no sign of decay in that wood which had been submitted to the rotting action for five years,* nor of that destruction which seems to have come on so soon in the same pit with other pieces of wood.

Sir Robert Smirke had had a couple of posts put up under a dropping eave, and both were exposed to the same actions. After a certain time one of them decayed; the other still stands, having been preserved by the power of this substance. There were before him some specimens of convass and cotton which had been in various ways exposed to damp, placed in a cellar on the 10th of December, 1832, and left till the 21st February, 1833: they were taken out for the purpose of being exhibited that evening. Another, a prepared and unprepared piece, which had been coiled up in a cellar from the 15th December, and left to the 21st February, 1833. The opposite effects seen were produced by the same circumstances of exposure on prepared and unprepared calico. One was as it went in, but the other was the calico corresponding to it, which had rotted and decayed. It was not possible to unfold it without destroying it, yet it had been similarly exposed as the first. Nothing could here deceive regarding the appearance of mildew; the difference between the two was so evident, that no person could make a mistake about them: one had run into decay, and was falling to pieces. Now he (Prof. Faraday) must confess, for his own part, that he was perfectly satisfied of the preservative effects of corrosive sublimate. He knew beforehand that it would preserve things far more liable to decay than timber,

canvass, and cotton, but had had doubts as to its application. His query, in the first place, had been—was this preventive, or anti-corruptive, substance, of such a nature that it could remain there, or was the effect not merely a temporary one, that would pass away after a time; and in the timber of vessels which were exposed to the bilge-water, and other water, where vessels were not coppered, was the sublimate not likely to be removed, and its effects destroyed? and, if that were not the case, was there not a fatal injury that might arise from the production of a noxious atmosphere? The answer was "No, we expect not; for chemical combination has taken place between the corrosive sublimate and the body to be preserved; and it prevents the destructive power going on, by combining and forming a new chemical compound with the albuminous matter of the wood." This being to him at that time a doubtful opinion, he wished to obtain some proofs for his own satisfaction. And it was certainly true that the juices and sap of a plant were of such a nature that they would precipitate corrosive sublimate. He had before him, by way of illustration, a solution of corrosive sublimate, which would prove that the juices, or rather substances, remaining from the juices in the fibres of the plant, were easy of combination; that if a stem or branch of a tree were cut, the branch allowed to bleed, and the sap made to flow into a solution of the corrosive sublimate, combination did take place. Some of the solutions used for the purpose were now exhibited; also, various infusions of juices from plants. He took one of these, and poured it into solution of corrosive sublimate; a combination was *instantly* effected, like the combination of vegetable substances with mineral bodies, producing similar effects, and altering the nature of the substance from that derived from the original source. It was also the nature of corrosive sublimate itself, that it entered, in this case, into a new combination, and that new properties were superinduced on the old ones. Therefore it was not to be expected, when they thus come together by a kind of chemical union, that the properties of the original substance should be free to act. No; part of the properties of the corrosive sublimate were subdued, and, in fact, the substance was not in that state in which it could be volatilized, or removed at ordinary temperatures. Very simple proofs would be satisfactory. It occurred to him to take some of the prepared canvass, washing it thoroughly in water several times, to see if the sublimate could be removed from the cloth. Calico was taken in preference, because it seemed more easily to allow the removal of the new chemical combination, if that could be effected. He thought it would be the most conclusive proof to be obtained; for, if the properties of the compound would resist the application of water in calico, they would of course do so in timber, where the substance, combining with the sublimate, was contained in the pores of the sap vessels. Not being satisfied with the work of others, he washed the prepared calico himself in water: he then showed a board on which he had put this washed calico; on one part was shown the portion of prepared calico which had been washed, and on the other a similar piece unprepared. The latter was covered with a coat of fungus nearly half an inch

thick; the former was quite free from it. To be certain whether the calico so prepared and washed did retain any mercury, and to assure himself that it had not been accidentally so placed in the damp cellar that it was left uncorroded, while the unprepared piece was corroded, a portion was treated with dilute nitric acid, by which means he could, though to the injury of the whole material, separate the mercury. By washing the prepared calico in water, he was unable to obtain any portion of the metal, but the mercury *was* separated by nitric acid, showing that it had been in combination; and there was no reason, after such trials, to suppose it could be washed away, or rise as vapour, and be injurious. These two or three experiments influenced him in giving his judgment, that the process would be found effectual in preserving timber. He added, *I think the improvement so great as fully to justify its extensive application.*

A variety of official documents for His Majesty's Government, in proof of the efficacy of this process, have also been forwarded to us, which are perfectly satisfactory as to the practicability and success of the preparation.

Documents have also been received from high medical authority, that the process is in no way noxious, or deleterious to the health of the parties employed therein, or in the after use of the timber.

[*Lond. Jour.*

On the use of steam expansively, in a letter from Mr. John Farey *to the Editor of the Repertory of Patent Inventions. Dated London, February* 24, 1833.

Sir,—In your last number, at p. 103,* it is stated, that the merit of the discovery of the method of working steam engines by the expansive action of steam continuing the motion of the piston, after the communication from the boiler to the cylinder is cut off, is due to Hornblower, who, in 1781, obtained a patent for the invention that he used two cylinders; and Mr. Watt, in the following year, obtained a patent for expanding steam in one cylinder.

As this is a mis-statement which tends to take from Mr. Watt the merit of one of his most valuable discoveries, and transfer that merit to another, it concerns the reputation of your Repertory to have it corrected. The facts are all upon record, and are as follows—

Mr. Watt had fully conceived the expansion principle at a very early period of his brilliant career, about the time of his first patent in 1769; a letter written by him from Glasgow, to his friend Dr. Small, at Birmingham, dated 28th May, 1769, contains the following passage—"I mentioned to you a method of still doubling the effect of the steam, and that tolerably easy, by using the power of steam rushing into a vacuum, at present lost. This would do little more than double the effect; but it would too much enlarge the vessels to use it all. It is peculiarly applicable to wheel engines; and may sup-

* This Journal, p. 277.

ply the want of a condensor, where force of steam only is used; for open one of the steam valves, and admit steam until one-fourth of the distance between it and the next valve is filled with steam; shut the valve, and the steam will continue to expand, and to press round the wheel with a diminishing power, ending in one-fourth of its first exertion. The sum of the series you will find greater than one-half, though only one-fourth steam was used. The power will indeed be unequal, but this can be remedied by a fly, or in several other ways."

This passage shows a full knowledge of the principle of expansive action, and Mr. Watt applied it to practice in an engine at the Soho Works, in 1776, and in the engine at Shadwell Water Works, London, in 1778, just in the same manner as has ever since been followed. Mr. Hornblower's invention, for which he had a patent in 1781, was the use of two cylinders, which was his means of carrying Mr. Watt's previous invention of expansive action into effect; and there is no statement whatever in Mr. Hornblower's specification, announcing the principle of expansive action as his invention or discovery.*

Mr. Watt's subsequent patent of 1782, was for various contrivances to cause the unequal powers wherewith the steam presses upon the piston, during the act of expanding, to produce uniform effects in working the pumps. None of those contrivances have come into use any more than Mr. Hornblower's two cylinders; but the original plan adopted by Mr. Watt, in the engine at Soho, in 1766, has been followed to the present day, without alteration, in the engines made by Messrs. Boulton and Watt.

Mr. Hornblower's claims as an inventor, became a subject of public inquiry in 1792, when he applied to parliament for an extension of the term of his patent of 1781, and was opposed by Messrs. Boulton and Watt. The advantages of his method of using two cylinders, over Mr. Watt's method of using one cylinder, was strongly urged; but no claim was set up by Mr. Hornblower, to the merit of having discovered the principle of working by expansive action; and, I believe your last number is the first printed statement to that effect.

Another statement requiring correction in your last number, pp. 100, 109, 110, is, that the best engines by Boulton and Watt, are estimated as capable of raising 19,800,000 lbs. per bushel of coals, which number is adopted for a term for comparison with an extraordinary performance of the best modern engine.

The fact is that 19.8 millions is the average performance of about twenty-seven engines in Cornwall, taken during the whole of the years 1813 and 1814, when Mr. Watt's system was universally followed;

* The passage occupying the last four lines of your p. 103, and the first three lines of the following page, although beginning with, "He states that," and marked with inverted commas, is not to be found in Mr. Hornblower's specification, (which is printed in the first series of your Repertory, vol. iv. p. 362,) nor any words to the same effect. This mode of misquoting from your own work, calls for your examination in your editorial capacity, particularly when the tendency is to attribute the inventions of one man to another. After you have examined the roll, you can inform your readers whether it is a fair quotation of any thing stated by Mr. Hornblower.

and a corresponding two years average of the performance of the engine at Wheal Towan, viz. 1828 and 1829, is 76.76 millions, which is far below the very extraordinary performance of 125,749,330. The statement of eight cubic feet of water being converted into steam by a bushel of coals, pp. 102 and 110, is liable to the same objection, that being the very lowest performance of badly managed engines: good boilers of Mr. Watt's construction, will evaporate ten cubic feet for an average performance.

If you think the subject of the performance of the steam engines in Cornwall interesting to your readers, you may, perhaps, choose to give them a reprint of a paper, of which I enclose a copy, and which I drew up with great attention to accuracy, at the former time when the law of patents was a subject of inquiry by the legislature, and I had occasion to cite Mr. Woolf as a notable instance amongst inventors left unrewarded by patents.

Remarks by the Editor of the Repertory.

We have great pleasure in giving insertion to Mr. Farey's letter, being at all times most anxious to correct any errors which may accidentally get into our pages.

It would appear that the inverted commas are inserted in the wrong place, the last sentence only of the paragraph of Mr. Galloway's paper, referred to by Mr. Farey, will be found to be verbatim from Hornblower's specification. The words of the specification are, "*I employ the steam after it has acted in the first vessel, to operate a second time in the other, by permitting it to expand itself, which I do by connecting the vessels together, and forming proper channels and apertures.*"*

We have also given Mr. Farey's paper, relative to Mr. Woolf, by which, and the paper of Mr. Galloway in our last, our readers will now be in possession of the most valuable information on the subject of using steam expansively; yet we should be wanting in our duty if we were not to take this opportunity of remarking that, having again read Woolf's specification (which from beginning to end is one series of errors,) and after some years' knowledge of the subject, and even after having read the present paper of Mr. Farey, we have not been able to find out what was Woolf's invention or discovery; nor have we ever been able to ascertain why his friends should have considered him deserving reward from his country as an unrewarded patentee, when there was not one tittle of truth, or invention, in the whole of his specification. All the merit he can possibly be entitled to is for his perseverance in getting expansive steam more generally used in Cornwall; but this was not effected till he had abandoned every principle laid down in his specification;† and there are many others in Cornwall equally deserving credit for perseverance. If there be any points which have not come to our knowledge in respect of Woolf's

* Vol. iv. p. 362, Repertory of Arts.

† Vol. vi. p. 84, second series, Repertory of Arts.

claim, no one can set us right better than Mr. Farey, and we shall be happy to publish any thing which may be the means of producing a just reward.—Ed.

(*To be continued.*)

¶ POPULAR SCIENCE.

No. V.

On the Instincts of Birds. By John Blackwall, *Esq. F.L.S.*

The manners and economy of the inferior orders of animals, form one of the most interesting subjects of investigation which can engage the attention of the philosophic naturalist. An acquaintance with this important but greatly neglected branch of zoology, conduces to the correction of numerous erroneous opinions, and groundless prejudices, aud opens an inexhaustible source of valuable information and rational amusement. It throws also much light on the operations of that mysterious agency which regulates those actions of animated beings, that, although attended with consciousness, do not result from observation, instruction, experience, or reflection, and have, therefore, generally been termed *instinctive actions.*

When we consider how many creatures are objects of superstitious dread or veneration, and what multitudes, even in this enlightened age and country, are sacrificed annually to mistaken notions of their mischievous properties, reason and humanity are alike shocked; and we deeply deplore the prevalence of errors, which the zealous promulgation of more correct ideas and liberal sentiments can alone effectually remedy. That useful bird, the white owl, which, on account of the great number of mice it destroys, ought to be carefully protected by the farmer, is frequently looked upon with terror as a forerunner of death, which it is supposed to announce by its loud and dissonant screams; and a small coleopterous insect, the *Anobiam tessellatum* of entomologists, has obtained the appellation of Deathwatch, from a fancied connexion between the ticking sound it produces, and that awful event. The raven and magpie are imagined, by persons of weak intellect and timid dispositions, to prognosticate evil; and this notion has been extended and perpetuated by the allusions made to it in numerous legendary tales, and in the writings of our poets. To take the life of a swallow or martin, or to disturb their nests, is regarded as an unlucky event, portending disaster to the unfeeling aggressor; and the red-breast and wren owe much of their security to popular prepossessions, equally without any rational foundation. Many birds which subsist almost entirely on insects, as the cuckoo, redstart, and flycatcher, are shot by ignorant gardeners and nurserymen, indiscriminately with those species which feed principally on the seeds of plants, and other vegetable productions. The goatsucker and the hedgehog are falsely accused of sucking the teats of animals, and a price, usually paid out of the parish rates, is still given

for the latter in many parts of England;* and those beautiful and harmless reptiles, the common snake and blindworm, are destroyed without pity, upon the groundless supposition that they are venomous.

These are a few instances only, selected from many that have fallen under my own observation, of the pernicious consequences which result from an ignorance of that useful portion of natural history which at present engages our consideration.

We will now proceed to notice, briefly, some of the numerous advantages to be derived from a successful cultivation of this delightful study; and a correction of the above-mentioned errors and abuses, with the needless waste of life which it would prevent, is not among the least of them. For the preservation of our persons and property, from those creatures by which they are liable to be injured: for the best methods of promoting the increase, improving the condition, and effecting the subjection of such as contribute to our benefit or amusement; and for the skilful management of our valuable reclaimed and domestic animals, which supply us with so many comforts and luxuries, we must depend, in a great measure, upon our knowledge of their habits, manners, and propensities. To this knowledge, also, the practical physiologist is indebted for a means of enlarging his acquaintance with the phenomena of life; the scientific naturalist, and particularly the ornithologist, for an excellent mode of distinguishing species, under circumstances in which the ordinary rules for determining them are of little or no avail; and the physico-theologist, for a more comprehensive view of the power, wisdom, and goodness, of the Creator, as manifested in his living works.

Having thus succinctly adverted to the great importance of accurate information in this extensive department of zoology, I shall now limit my remarks exclusively to the feathered tribes; and whoever attentively considers the diversified operations of the various active powers, with which the interesting beings that compose this pleasing division of the animal kingdom are endowed, cannot fail to receive a high degree of mental gratification.

It frequently happens, that the experienced observer is enabled to discriminate birds with the utmost certainty, by their notes, manner of flight, or some other peculiarity, when he has no opportunity of procuring specimens of them, or of ascertaining the colours of their plumage. Indeed, in this last particular, distinct species, as the willow wrens, several of the larks, finches, &c. so nearly resemble each other; and individuals of the same species, as many of the falcons, gulls, sandpipers, ducks, &c., are so very dissimilar, and vary so greatly with age, change of season, and other circumstances, that colour cannot always be relied upon as affording sufficient evidence

*Sixpence a-head, I am well informed, has been recently obtained for hedgehogs in this parish. Now, it is truly disgraceful that any portion of the public money should be expended to encourage the destruction of an inoffensive animal, which derives its support from insects and vegetables, because, in the opinion of the vulgar, it is injurious to cattle.

of specific identity. A much surer criterion will be found in the uniformity so conspicuous in the manners and economy of birds of the same kind; a coincidence which can only be accounted for by supposing that their actions are instinctive. That this is actually the case I shall attempt to show, though it must be admitted that they are occasionally modified, in a considerable degree, by the exercise of the intellectual faculties.

I will not occupy the time of the Society in examining the many vague and contradictory opinions, which have been entertained with regard to the nature of instinct, by the various authors who have written on the subject, being convinced that they are purely speculative, and tend to retard, rather than advance, the progress of science. We must not, however, pass unnoticed, the sophistical doctrine, so ingeniously maintained by Dr. Darwin, in Zoonomia,* that what is usually termed instinct in animals, has reference to the powers of intellect solely; since the feathered tribe, notwithstanding the highly curious and unequivocal examples of instinctive actions which they exhibit, have furnished him with some of his most plausible arguments in support of it.

Depending on the assertion of Kircher,† that young nightingales, when hatched by other birds, never sing till they are instructed; and confiding in the remarks of Johnston,‡ that the nightingales which visit Scotland have not the same harmony as those of Italy; Dr. Darwin was hastily led to conclude, that the songs of birds, in general, are artificial. Having observed, also, that poultry readily obey their usual summons to be fed, and that young ducks, hatched under the domestic hen, soon appear to understand her calls; and giving credit to the mistaken idea, that wagtails and hedge-warblers feed the young cuckoos they bring up, long after they leave the nest, whenever they hear their cuckooing, which, on the authority of Linnæus, § he states to be their cry of hunger, he was induced to adopt the same opinion respecting their calls. Now, whether the song of the nightingale results from education, as Kircher maintains, or whether it is wholly independent of tuition, I have never had any direct means of deciding, as the bird is only an accidental visiter in this part of the kingdom. From unexceptionable experiments, however, made with the greatest care, on several other species of British singing birds, I have no hesitation in affirming, that the peculiar song of each is the natural consequence of an instinctive impulse, combined with a suitable state of the vocal organs. This latter condition deserves particular attention, for it is a fact, which has been very generally overlooked, that most of our songsters are absolutely unable to continue their melodious strains beyond the latter end of July, or the beginning of August; the strenuous but unavailing exertions they make to prolong them, sufficiently proving their silence not to be a matter of choice, but of necessity. This circumstance, together with the extreme difficulty

* See the section on Instinct, vol. i.

† De Musurgia, cap. de Lusciniis.

‡ Pennant's British Zoology.

§ Systema Naturæ.

they experience in recommencing their songs in spring, clearly demonstrates, that their delightful warblings depend upon the energy of those muscles which contribute to form the voice; an energy which appears to be influenced chiefly by food, temperature, and the exercise of the reproductive functions; for, by due attention to the regulation of these particulars, the vocal powers of caged birds may be called into action, or circumscribed at pleasure. Of this, persons who have the management of breading canaries may easily satisfy themselves; and female birds, in a state of captivity, when brought into high condition, are known, occasionally to assume the song of the male. That Johnston must have been deceived in supposing he heard the nightingale in Scotland, is evident, as it is well known that this warbler is never found north of the Tweed, in Great Britain. It has been ascertained, too, contrary to the opinion of Linnæus, that young cuckoos, before they come to maturity, utter a feeble cry only; they cannot, therefore, acquire the calls of their species while they remain in this country. No wonder, then, that the conclusion Dr. Darwin arrived at was erroneous, when the premises on which his reasoning is grounded are so inaccurate.

It is not, let me remark, intended to insinuate, that birds are incapable of attaining any knowledge of each other's notes, since our domestic fowls, in many instances, are certainly enabled, by observation and experience, to connect vocal sounds with the ideas they are intended to convey.* The martin, also, readily learns to distinguish the swallow's call of alarm; and the ringed plover, sanderling, and dunlin, when associated together, evince, by the promptitude and exactness with which they perform their various aërial evolutions, that they comprehend one general signal. All that is meant to be insisted upon is, that the notes peculiar to every species, in a state of nature, are instinctive. This I have endeavoured to prove, in an essay read before the Society in 1822, and printed in the fourth volume of the new series of Memoirs, by showing, that even such individuals as are brought up in situations where they have no opportunity of being instructed in their appropriate notes, do, nevertheless, utter them naturally.

Dr. Darwin conjectures that birds learn how to build their nests from observing those in which they are educated, and from their knowledge of such things as are most agreeable to their touch in respect to warmth, cleanliness, and stability; but the undeniable fact that birds, when taken very young, even before they can see, and brought up in confinement, do sometimes construct nests, is alone sufficient to refute this opinion.

The sparrow hawk and kestril often make use of the deserted habitation of the magpie as a receptacle for their eggs, and the sparrow frequently takes forcible possession of the rustic dwelling of the house-

* When our domestic cock gives notice to his mates that he has discovered some choice morsel of food, the turkey-hens always hasten to secure the delicacy, which the gallant chanticleer suffers them to take, even out of his beak, without the least molestation.

martin for the same purpose. Why, then, are they never known to build nests similar to those which they thus appropriate to themselves? and why does not the cuckoo, which is always brought up in the nest of some other bird, construct one itself?* The reason is obvious, the act of nidification is not regulated by observation or instruction, but is under the immediate direction of instinct.

Guided by this mysterious power, individuals of the same species, under the like circumstances, always adhere to the same style of architecture. Thus, some of the smaller birds, which produce a large number of eggs, constantly make the entrance to their nests very narrow, and line the interior with an abundance of such materials as conduct heat slowly; while the ringdove, which lays two eggs only, forms so slight a structure, that they may be frequently seen through it. The partridge, land-rail, and those birds whose young are able to run almost as soon as they are hatched, generally give themselves very little trouble in providing nests for their progeny; and some species of water fowl do not make any, but deposit their eggs in the crevices, and on the projecting shelves and ledges of lofty rocks, or upon the bare ground. The sociable grosbeak builds in society under a common roof. The Pensile, Abysinian, and Phillippine grosbeaks construct curious nests, which they suspend from the slender twigs of trees, particularly such as grow over water; by this means, securing their offspring from the predatory attacks of their numerous enemies; and the tailor-bird frames its temporary abode by sewing two leaves together with the flexible fibres of the plants, and lining the cavity with the lightest and softest animal or vegetable down.

It is true, that in preparing their nests, birds occasionally accommodate themselves to some circumstances, and take advantage of others, in a manner which seems to indicate a large share of intelligence. The wren, for example, usually adapts the exterior of its compact fabric to the situation in which it is placed. When built against a hay stack, hay is almost invariably made use of, and green mosses, or withered leaves, and ferns, are employed, as green or the various shades of brown, prevail in this vicinity. Nor, let it be imagined that these substances, which, from their contiguity, are often most easily procured, are selected as a matter of convenience merely; for I have known this minute bird bring long pieces of straw from a considerable distance with much toil, and, with incredible perseverance, mould the stubborn material to its purpose, solely because its colour approached that of a garden wall, a hole in which, occasioned by the giving way of a loose brick, it had chosen to place its nest in.

A lady who keeps canaries was obliged to separate a young brood from their parents, having observed that the male bird stripped off

* I have pointed out the errors into which Dr. Darwin has fallen in his remarks on the cuckoo, in my observations on that bird, printed in the fourth volume of the new series of the Society's Memoirs.

the soft feathers from their necks and wings, for the purpose of lining a newly constructed nest with them, notwithstanding a supply of old feathers had been put into the cage. From this remarkable fact, for which I am indebted to Dr. W. Henry, it is evident, that canaries do not collect materials for their nests indiscriminately, but that they make a selection, in which they are directed by powers of a higher order than those of a merely instinctive character.

Mr. White, in his Natural History of Selborne, p. 59, informs us, that in Sussex, where there are very few towers and steeples, the jackdaw builds annually under ground, in deserted rabbit furrows. The same author remarks also, p. 175–6, that many sand-martins nestle and breed in the scaffold holes of the back wall of William of Wykeman's stables, which stand in a very sequestered enclosure, facing a large and beautiful lake near the town of Bishops Waltham in Hampshire; and some birds, as already represented, frequently spare their own labour, by taking possession of the nests of others.

In these instances there certainly appears to be a great display of sagacity; yet there are facts which seem to render it doubtful, whether the feathered tribes are capable of deriving much benefit from experience, or of exercising any remarkable degree of intelligence. Thus, birds when engaged in the performance of their parental duties expose themselves without hesitation to dangers which at another period they would carefully avoid. Many species, also, while under the incitement of appetite, are readily snared by the most simple contrivances, directly after witnessing the capture of their companions; and rooks continue to breed in those rookeries, where the greater part of their young is destroyed every spring.* For three successive seasons a pair of redstarts persisted in making their nests in the upper part of our pump, on that end of the lever which is connected with the rod of the piston, and, of course, always had it disturbed when that engine was used. Mr. White observes,† too, that in the neighbourhood of Selborne, martins build year by year in the corners of the windows of a house without eaves, situated in an exposed district; and as the corners of these windows are too shallow to protect the nests from injury, they are washed down every hard rain; yet the birds drudge on to no purpose from summer to summer, without changing their aspect or house.

These actions, it cannot be denied, seem to indicate a more limited degree of sagacity in birds, than might be inferred from those immediately preceding them. This apparent contradiction, however, may be easily reconciled, by admitting, what in all probability will be thought sufficiently obvious, that the dictates of the understanding are frequently too feeble to resist the powerful influence of instinctive impulse. Several examples, illustrative of this view of the subject will be found interspersed through the remainder of the essay.

* I am assured by T. Leigh; Esq., that many thousands of young rooks are shot every breeding season in his extensive rookery at Lyme Park, in Cheshire.

† Natural History of Selborne, p. 160.

There is not any necessity, therefore, for entering into a more detailed consideration of it here.

[TO BE CONTINUED.]

Meteorological Observations for September, 1833.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Dew point	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches				Inches.	
	1	65°	85°	29.75	29.75	58°	SW. N.	Brisk.		Clear day.
	2	56	29	.95	.95	57	W.	Moderate.		Flying clouds—clear.
	3	56	64	30.00	30.00	55	E.	Calm.		Cloudy day.
	4	65	80	29.80	29.80	69	·S	Moderate.		Cloudy—flying clouds.
	5	65	84	.90	.90	63	W.	do.		Light clouds—do—Aurora bo
	6	64	79	30.00	30.00	57	W.	do.		Cloudy—light clouds. [realis.
	7	56	69	.00	.00	60	W. SW.	do.	1.80	Cloudy—drizzle—rain in the
☽	8	60	61	29.80	29.85	59	E.	Blustering	0.09	Drizzle. [night.
	9	55	70	30.00	30.00	53	SE.	Moderate.		Cloudy—flying clouds.
	10	56	72	29.85	29.72	65	W.	Blustering	0.10	Cloudy—thunder shower.
	11	54	69	.83	.90	43	W.	Brisk.		Clear day.
	12	54	63	30.00	30.10	53	W.	do.	0.30	Cloudy—rain.
	13	45	61	.15	.15	40	NW.	do.		Clear day.
	14	43	62	.10	.10	43	W.	Moderate.		Clear day.
⊗	15	44	69	29.90	29 90	48	W.	do.		Clear day.
	16	51	69	.95	30.00	50	W.	do.		Clear day.
	17	56	70	30.05	.10	52	W. SW.	do.		Clear day.
	18	59	64	29.90	29.95	62	SW.	do.	0.70	Rain.
	19	64	77	.90	.90	72	W.	do.		Fog—clear.
	20	64	64	.86	.80	71	W.	do.	0.25	Clear — rain—thunder—high
	21	68	63	.80	.80	69	N.	do.	0.02	Cloudy—drizzle. [wind.
☾	22	50	64	30·00	30.00	46	NW.	do.		Flying clouds—clear.
	23	49	64	.00	.00	46	W.	Brisk.		Clear day.
	24	49	65	29.90	29.90	46	W.	do.		Clear day.
	25	50	70	.90	.90	45	W.	do.		Clear day.
	26	52	72	.85	.80	55	W.	do.		Clear day.
	27	55	78	.70	.75	57	W.	do.		Clear day.
	28	58	75	.90	.93	58	NE.	do.		Clear day.
	29	64	80	.90	.90	63	S.	do.	0.04	Cloudy—clear—shower in the
☺	30	64	73	30.00	30.05	51	W.	do.		Clear day. [night
	Mean	56.37	68.83	29.92	29.93	54.8			3.30	

	Thermometer.	Barometer.
Maximum height during the month,	85. on 1st.	30.15 on 13th.
Minimum do. . . .	29. on 2nd.	29.70 on 27th.
Mean do. . . .	63.60 .	29.92

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MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

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AMERICAN AND OTHER PATENTED INVENTIONS.

DECEMBER, 1833.

Experiments made on the Navigation of the Chesapeake and Delaware Canal by Steam, reported by A. D. Bache, *Professor of Natural Philosophy and Chemistry in the University of Pennsylvania.*

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

The great importance of applying steam to navigation upon canals, has not failed to strike those interested in that mode of internal communication. It has been denied that steam navigation is possible in canals, when injury to the banks is not guarded against by expensive precautions; and that it can be advantageously applied in any case is still doubted, notwithstanding the attempt in Great Britain which is reported to have been successful. The result of experiments made on the Chesapeake and Delaware canal, seem to me to go far to remove, entirely, such doubts in relation to the larger class of canals; and with this impression I have supposed that a report of them might prove interesting.

In the experiments of which I am about to give an account, I assisted, without directing; all that is set down as coming from myself was obtained by careful observation, and when the information has been received from others, the authorities upon which it rests are also given. I engaged in these experiments with a view to their bearing upon an interesting inquiry in practical science, and the materials

are so laid before the reader that he may have a test of the accuracy of the observations, and of the conclusions which may be drawn from them.

A canal boat which had originally plied upon the Schuylkill, and been noted as a quick boat, was altered, under the direction of the President of the Chesapeake and Delaware Canal Company, (Robt. M. Lewis, Esq.) so as to increase the length, and to give greater sharpness to the bow, as well as to reduce the bottom to a regular and gently swelling curved surface, from the stem and stern, without any internal flexures. The length of the boat was thus made eighty feet, the length of the false bow, in the direction of the axis of the boat, being seven and a half feet; the width of the boat was ten feet; the draught, when light, twelve inches, and with a load of forty tons, fourteen inches, exclusive of the keel. The alterations were made under the direction of Mr. James Rush, of the firm of Rush & Muhlenburgh, and the engine, paddle wheels, &c. put in under his charge; from him I obtained the details just given, and those which follow, in relation to the boat and engine.

The engine was the result of an exchange, which enabled the experiment to be made with economy; it proved, however, to be much too small for the purposes in view. The diameter of the cylinder was eight and a half inches, and the length of stroke two and a half feet, the pressure of the steam with which it was supplied was about 140 lbs.; 150 lbs. to the square inch, on the safety valve, being the maximum pressure. The steam was cut off at half stroke and the escape steam served to heat, in part, the water which was thrown into the boiler. The nominal power of the engine was ten horses; but with a mean effective pressure, during the stroke, of 80 lbs. per square inch, an estimate probably not far from the truth if the pressure within the boiler was correctly stated, and supposing thirty-five double strokes to be made in a minute, the power would be more than double the nominal amount. The boiler was a vertical cylinder, six feet in length, and three feet in interior diameter, containing one hundrrd and twenty draught tubes from an inch and a half to two inches in diameter, and thirty inches in length, the tubes uniting above in a wide chimney. It appeared by the experiments that this boiler was competent to keep up a supply of steam for about thirty-five double strokes of the engine per minute. The paddle wheels were placed at the sides of the boat, and between one-third and one-half of the length of the boat from the bow; the wheels were eight feet two inches in exterior diameter, and four and a half feet wide; the buckets were six inches deep, and made of cast iron. The weight of the boiler was stated to be 2214 lbs., and of the wheels about one ton.

The preliminary trials with the boat were made on the river Schuylkill; upon them, as they were not made in the precise circumstances in which the boat would have to work in the canal, not much stress was to be laid; they were so far satisfactory, however, as to speed, and to the slight apparent swell produced by the boat at the highest speed of which the engine was capable, as to induce the President of the Canal Company to have the boat sent to the Chesapeake and

Delaware canal for further trial. A summary of the results obtained in a trip from the upper ferry to Gray's ferry, and back again, and in several short trips from near the middle ferry to near Gray's ferry, is given below. The averages being deduced from different numbers of experiments are not entirely comparable, but are probably as close approximations as the nature of the other data will furnish; the distances were measured from Allen's map of Philadelphia, and having been thus obtained can only be considered as approximations.

The tide was running down, and near the last of the ebb, the wind was from the S. E., and therefore, in part, favourable in those trips in which the tide was adverse.

Greatest speed down stream,	8.45 miles per hour.		
Least do. do.	6.50	do.	Steam stopped off to pass under the middle ferry bridge.
Greatest speed up stream	7.35 miles per hour.		
Least do. do.	6.50	do.	
Average speed down stream	7.37	do.	Mean 7.12 miles per hour.
Do. up stream	6.88	do.	
Greatest number of revolutions of paddle wheels per minute	39		
Least do. do. do.	30		
Average do. do. do.	33½		
Average ratio of the velocity of the boat to the velocity of the circumference of the paddle wheel - - -	73 to 100		

I have thought it best to give these conclusions, since they are sufficiently correct to afford a tolerable comparison with the inferences from similar experiments on the canal, and thus to enable the results for a stream to be compared with those in the comparatively narrow and shallow canal.

In the experiments on the Chesapeake and Delaware canal, circumstances were much more favourable to accuracy, and greater interest attaching to the observations, greater pains were taken to insure it. The marks upon the tow path were referred to as affording points at known, or easily ascertained, distances apart, and by a subsequent comparison of these with the corresponding measures in the channel of the canal, as afforded by the survey of the work, where it is not straight, the true distances were found. The time being observed by myself, with a watch with a seconds hand, was recorded by a friend who entered upon the notes any other observations which it was deemed necessary to preserve. In these experiments, although pains were taken to ascertain the speed of the boat and the capabilities of the engine, yet the main interest attached to the observation of the disturbance produced upon the banks at different degrees of speed, and to determining the effect of the figure of the boat, and the combined action of the boat and of the wheels, upon the water; the power of the engine could easily be increased within reasonable limits, provided the effect was not such, with the less power, as to produce a very great wash of the banks. To any one who has witnessed the labour

with which the rapid travelling upon this canal in barges towed by horses is accomplished, and the violent effects upon the banks produced by the great swell raised, a desire to substitute some less painful and less destructive method of navigation can hardly fail to occur.

The circumstances under which the steam-boat was to be tried were three in number; first, its use as a means of towing light barges for passengers; second, as a means of towing heavy boats of burthen; third, the comparative effect of using the boat alone, as to speed, as to injury to the banks of the canal, &c.

In the annexed statement, six columns are devoted to the record of experiments, and to the results of calculations; the first column gives the points at which the observations were made; the second, third, and fourth, the time of observation; the fifth, the number of revolutions of the paddle wheel per minute; and the sixth, general remarks. In the seventh column are the breadths of the canal at the several points of observation; in the eighth, the actual distances gone over, obtained as already described; in the eighth and ninth the time occupied in passing over the distances; in the tenth the rate of travel per hour, and in the eleventh the relative velocity of the boat to that of the periphery of the wheel, the velocity of the latter being taken as unity. The actual depths of the sheet of water at the several points of observation, to correspond with the breadths given in the seventh column, would have been interesting, but have not been taken in any surveys of the canal yet made. The widths of the canal are approximations, only; they were taken from a map of the survey of the canal.

Journal of the Experiments on the Navigation of the Chesapeake and Delaware Canal by the Steam-boat Lewis, September 22nd, 1833.

FIRST EXPERIMENT.

The steam-boat towing one of the barges, for passengers, used upon the canal.

Length of barge 90 feet, breadth of beam 19 feet, draught, when light 23 inches, including the keel, which is 11 inches; draught with the ordinary number of passengers 33 inches.* Awning of the barge up.

The barge 15 feet in rear of the steam-boat.

Twenty-eight persons in the steam-boat; seven in the barge.

* Reported by Mr. T. Craven.

Points at which the observations were made.	Time of passing the points.			No. of revolutions.	Remarks.	Width of water way.	Distance between stations	Time between stations		Rate per hour.	Ratio of velocity of boat to velocity of wheel.
	Hrs.	Min.	Sec.		Barge in tow.	Yds.	Yds.	Min.	Sec.	Miles	
Post 300 yds. east of Delaware bridge	8	14	45	37½	Wind strong in favour.	26 2–3					
Middle of Delaware bridge . .	„	16	35	—	Steam shut off, in part, 30 seconds in order to pass the bridge.		302				
Post 300 yds. west of Delaware bridge	„	18	22	36		56	302				
Mile post No. 1. . .	„	20	30	34½		59	385	2	08	6.16	.61
About the half mile . .				36							
Mile post No. 2. . .	„	30	40	—	1 Min. 30 seconds lost.	26 2–3	1770	8	40	6.96	.65
					Mean, ...					6.56	.63
					Return trip, with barge.						
Mile post No. 2. . .	8	40	38	39	Wind brisk,—adverse.	26 2–3					
				35½	Wind on bow for about half a mile,						
				31½	and directly ahead the other half.						
Mile post No. 1. . .	„	53	00	31½	Close to bank, *no wash.*	59	1770	12	22	4.88	.48
Post 300 yds. west of Delaware bridge	„	56	05	33	30 feet from bank.	56	385	3	05	4.26	.44
Middle of Delaware bridge .	„	58	32	—	Steam, in part, shut off for 20 seconds.		302	2	27		
Post 300 yds. east of Delaware bridge	9	00	57	31½		26 2–3	302	2	25		
Post 300 yds. west of Delaware lock	„	04	20	33		26 2–3	471	3	23	4.74	.49
					Mean, ...					4.63	.47

Mean rate of boats. wind in favour	6.56 miles.	}	Relative rates.
,, ,, adverse	4.63 ,,	}	1.417 to 1.
Mean, . .	5.59		
Greatest rate of boats, wind in favour	6.96 miles.	}	Relative rates.
,, ,, adverse	4.88 ,,	}	1.426 to 1.

Mean ratio of veloc. of boat to veloc. of wheel, wind in favour,	.63
,, ,, ,, ,, adverse,	.47
Mean, ...	.55

SECOND EXPERIMENT.

The steam-boat, with thirteen persons on board.

Points at which the observations were made.	Time of observation. H.	M.	S.	No. of revolutions per minute.	Remarks. Steam-boat alone.	Width of water way. Yds.	Distance between stations Yds.	Time between stations. M.	S.	Rate of boat. Miles	Ratio of velocity of boat to velocity of wheel.
Post 300 yds. W. of Del. lock	9	12	35	39	Wind as in 1st. exp't.						
Post 300 yds. E. of Del. bridge	,,	14	35	39	Faster than boat, and in favour.	26 2-3	471	2	00	8.03	.71
Middle of Delaware bridge	,,	16	00	—	Steam shut off, in part, for 20 seconds.	26 2-3	302	—	—		
Post 300 yds. W. of Del. bridge	,,	17	32	37½	More wash than in first exp't. but still harmless	56	302	—	—		
Mile post No. 1.	,,	19	20	37½		59	385	1	48	7.29	.67
,, No. 2.	,,	26	30	39		59	1770	7	10	8.42	.77
				37½							
,, No. 3.	,,	34	09	37½		55	1768	7	39	7.88	.72
,, No. 4.	,,	41	50	37½		176	1755	7	41	7.79	.71
,, Post 300 yds. E. of Penn. lock	,,	43	30			44	—	1	40		
Post 300 yds. W. of Penn. lock	,,	58	08		Pass Pennsylvania lock. Wind slower than boat. Swell in front of boat just at a point opposite the bow was measured upon a stick, and found to be about 1 inch. Canal 9 to 10 ft. deep; pond 800 ft. wide.	275		15	22		
Mile post No. 5.	10	00	50	39		190		2	42		
,, No. 6.	,,	08	13	37½	Exp't. not precise.	132	1764	7	23	8.14	.73

SECOND EXPERIMENT, *Continued.*

After passing mile post No. 6 a sloop was attached by tow lines to the steam-boat; the burthen of the sloop was forty-four tons, the actual loads being fifty tons of anthracite, and the draught sixty-two inches exclusive of the keel. The helmsman of both the steam-boat and the sloop, not understanding the management of their respective vessels, in the new circumstances in which they were placed, there was so much sheering in one direction and another, that it was deemed expedient to cast off the tow lines on the approach of the psssenger barge which appeared in sight. The speed was estimated differently at from three to four miles per hour, but the checks which it constantly met with rendered any accuracy of estimate out of the question. The passenger barge, towed by *eleven* horses, now passed, and the steam-boat followed; part of the experiment, which follows, was made in the shallower end of a former mill-pond, and the other through about one quarter of a mile of the deep cut.

Points at which the observations were made.	Time of observation. H.	M.	S.	No. of revolutions per minute.	Remarks.	Width of water way. Yds.	Distance between stations. Yds.	Time between stations. M.	S.	Rate of boat. Miles	Ratio of velocity of boat to velocity of wheel.
					Steam-boat alone.						
Mile post No. 7.	10	34	52	37		210					
Mile post No. 8.	"	42	57	36	From the bottom of the depression to the top of the swell created by the barge, was, at the lowest, three and a half feet; the same height for the swell of the boat was one foot at the most. (In deep cut.)	26 2-3	1756	8	05	7.41	.70
					Mean, . .	. .	.			7.85	.71

SECOND EXPERIMENT, *Continued.*

Points at which the observations were made.	Time of observation. H.	Time of observation. M.	Time of observation. S.	No. of revolutions per minute.	Remarks. Return trip with steamboat alone.	Width of water way. Yds.	Distance between stations Yds.	Time between stations. M.	Time between stations. S.	Rate of boat. Miles	Ratio of velocity of boat to velocity of wheel.
				38	Light wind ahead.						
Mile post No. 7 . .	11	23	30	37½		270					
				36							
Mile post No. 6' . .		31	42	35		132	1769	8	12	7.36	.70
				37½	Wind strengthens.						
Mile post No. 5 .		39	53	37½		190	1764	8	11	7.35	.68
Post 300 yds. W. of Penn. lock		43	52	37½		275	—	3	59		
Pennsylvania lock .		50	20	—	In lock, and going 300 yds.			6	28		
Post 307 yds. E. of Penn. lock		52	18	33		44	—	1	58		
Mile post No. 4 . .		54	10	34½		176	—	1	52		
				34½							
Mile post No. 3 . .	12	02	20	—		55	1755	8	10	7.33	.73
				35							
Mile post No. 2 . .		10	18	35½		59	1768	7	58	7.56	.74
				34½							
Mile post No. 1 . .		17	55	—		59	1770	7	35	7.92	.77
Post 300 yds. W. of Del. bridge		19	40	—		56	385	1	45	7.50	
Middle of Delaware bridge		21	05	—	Steam slack.	26 2-3	302	1	24		
Post 300 yds. E. of Del. bridge		22	57	34½		26 2-3	302	1	52		
Post 300 yds. W. of Del. lock		25	15	33		—	471	2	18	6.98	.70
					Mean, . .	.	.			7.43	.72

Mean velocity of steam-boat, wind in favour 7.85 miles per hour. } Relative rates.
" " adverse 7.43 " } 1.055 to 1.

Mean, ... 7.64

Greatest vel. of steam-boat, wind in favour 8.42 " } Relative rates.
" " adverse 7.92 " } 1.068 to 1.

Mean ratio of velocity of boat to velocity of wheel, wind in favour, . .71
" " " " " adverse, . .72

THIRD EXPERIMENT.

Steam-boat towing a freight barge of twenty-five tons burthen, loaded with from fifteen to eighteen tons of merchandise, and drawing two and a half feet of water.

Wind very light, in favour of the boat.

Points at which the observations were made.	Time of observation. H.	M.	S.	No. of revolutions of wheels, per minute.	Remarks.	Width of water way. Yds.	Distance between stations. Yds.	Time between stations. M.	S.	Rate of boat Miles per hour.	Ratio of velocity of boat to velocity of wheels.
Post 300 yds. W. of Delaware lock.	12	40	34	34	Towing a freight barge.						
Post 300 yds. E. of Delaware bridge.		43	31	34		26 2-3	471	2	57	5.44	.55
Middle of Delaware bridge.		45	25		Steam slacked for 30 seconds.	26 2-3					
Post 800 yds. W. of Delaware bridge.		47	18	34½		56					
Mile post No.1.		49	22	35		59	385	2	04	6.36	.62
					Mean, .					5.95	.58

The passenger barge from the west appearing in sight, the freight barge was disengaged, and the boat put about. At the first part of this experiment there was a difficulty encountered similar to that noticed in the case of the attempt to tow the sloop, but less in degree; it resulted from the inexperience of the helmsman of the barge, and as soon as he had been directed how to steer, and followed the directions, there was no further trouble from this source.

FOURTH EXPERIMENT.

Steam-boat alone, returning in rear of the passenger barge drawn by seven horses.

Light wind ahead.

Points at which the observations were made.	Time of observations. H.	M.	S.	No. of revolutions of wheels, per minute.	Remarks.	Width of water way. Yds.	Distance between stations. Yds.	Time between stations. M.	S.	Rate of boat Miles per hour	Ratio of velocity of boat to velocity of wheel.
Mile post No. 1.	12	58	45		Steam-boat alone.	59					
Post 300 yds. W. of Delaware bridge.	1	00	40			56	385	1	55	6.84	
Delaware bridge.		02	00			26 2-3	302	1	20	7.74	
Post 300 yds. E. of Delaware bridge.		03	32			26 2-3	302	1	32	6.63	

The barge had seven horses, which of course were fatigued, for which circumstance allowance must be made; there was, however, no point of time in which the steam-boat could not have passed the barge after it had come up to it and, in fact, during part of the last 300 yards, and after passing the 300 yards post the steam was slackened occasionally, to keep from running too close to the barge.

Summary of the Average Results.

Mean velocity.	Miles per hour.	Mean ratio of veloc. of boat to velocity of wheel.	Remarks.	Average No. of revolutions per minute.
Steam boat alone, . .	7.64	.71	A mile in 7 min. and 7-8ths.	36·9
With passenger barge in tow,	5.59	.55		34.7
With freight barge in tow	5 95	.58	No exp'ts. against the wind.	35.1

In these experiments, at the highest rate of motion obtained, there was no swell produced in the straight parts of the canal, which would have been likely to injure the banks although not specially protected. The wave from the bow of the boat, owing to the peculiar form of that part, fell in with the wheels, and was disposed of by them; while the lean form of the stern brought together the waves produced by the wheels, which, therefore, spread very little, if at all, in a lateral direction, that is, towards the banks, being directed towards the tow-path only in parts of the curved portions of the canal. When the barge was in tow, and with the more rapid rate then assumed, nearly seven miles per hour, there was no perceptible swell behind the barge, the swell from the wheels not appearing after meeting the bow of the barge. There was no obvious change in the character of the swell at low and high velocities, but the experiments did not permit numerical accuracy upon this point.

At the time when the heights of the wave from the barge and from the steam-boat are noted in the remarks, the barge was so far before the boat that the latter was free from any effect produced by the swell of the former. It was in the deep cut, and the bow of the barge was elevated, and the stern depressed, mounting an inclined plane, while, besides the wave which preceded the bow, a destructive surge followed sweeping above the stoning of the banks of the tow-path. The wave from the steam-boat was included within limits comprising only a portion of the cover of the banks, and did not break with the violence necessary to carry away the soil and pebbles from behind the stones.

The boat suffered no sensible retardation in passing into the deep cut, for, in the latter part of the second experiment, with thirty-six and thirty-seven revolutions, the speed was about seven and a half miles per hour, while in the wider portions, with thirty-seven and a half, the speed was about seven miles and three-quarters. The same conclusion is to be drawn by comparing these results with those obtained in the Schuylkill; in fact, the average speed with a given number of revolutions upon the canal, rather exceeds that with the same number upon the river.

The want in power of the engine prevented the experiments from being conclusive in relation to towing, with high rates of motion, though they seem to indicate greater advantages from towing, at rapid rates, than in moving with the boat alone. That the speeds attained by even this imperfect model, compare with those which

the labour of eight horses is capable of producing, appears by the annexed memorandum received from the captain of one of the passenger barges which passes daily through the canal on the line from Philadelphia to Baltimore.

		Minutes.	Seconds.		Rate per hour in miles.
" From the 11th	to the 10th mile post,	9	40		6.02
10	9	10	00		6.00
9	8	9	00		6.67
8	7	8	40		6.92
7	6	7	55		7.58
6	5	7	20		8.18
5	4	13	50	Includes lockage.	
4	3	8	38		7.02
3	2	8	20		7.20
2	1	7	20		8.18
1	0	8	58		6.69

The average speed is about nine minutes to the mile, and two hours are required to pass the canal."

While then it would seem to be an easy matter to exceed the average speed which is attainable in towing by horses, the swell produced by one and by the other mode of conveyance are not comparable with each other.

A review of the experiments leads me to the conclusion indicated in the commencement of this article, namely, that steam power may be substituted for the present method of towing by horses on large canals, with great advantage to the canal, particularly at high velocities.

There was no opportunity on this occasion to examine into the cost of this mode of transportation, by ascertaining the amount of fuel consumed in the different trips; this point was investigated, and a further trial in towing heavy vessels was made by Caleb Newbold, Esq. As the results will serve to render my statements more full, I subjoin them.

	Hrs.	Mins.	Rate. Miles per hour.
" 1st. expt., steam-boat alone, St. Georges to Delaware City (4.25 miles)	0	33	7.73
2nd. expt., steam-boat alone, Delaware City to Chesapeake,	1	55	6.91
3d. expt., steam-boat alone, Chesapeake and Delaware city,	1	50	7.23

" In both of the last experiments the steam was slackened off repeatedly to accommodate vessels; the time given is exclusive of six

minutes for lockage. The most rapid rates of motion were one mile in six minutes and twenty seconds, (9.48 miles per hour,) and one mile in six minutes and thirty seconds, (9.23 miles per hour.) The greatest number of revolutions made in one minute by the wheels was forty-two. 575 lbs. *of pine wood*, of fair good quality, (about one-fifth of a cord,) were consumed in keeping up the steam for one hour and fifty minutes.

"4th. experiment, Delaware City to St. Georges, towing the schooner William and George, of 45½ tons burthen, empty, fifty-six minutes, (rate 4.5 miles per hour.)

"5th. experiment, St. Georges to Delaware City, towing the sloop Martha and Elizabeth, of 39 tons, clump built, heavy laden, drawing six feet of water, one hour and two minutes, (rate 4.1 miles per hour.) Part of the way there was a fair wind, and part of the way a strong side wind, which, owing to the want of keel of the steam-boat, pressed it somewhat on the tow path. The vessel is one of the heaviest *towers* of her class. No difficulty in steering, nor any embarrassment from *sheering*."

Prize medals to be awarded, for discoveries in Science, by the Royal Society of London.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—I am directed by the American Philosophical Society to communicate to you, for publication, the annexed letter, received at their last stated meeting. The object of the Society is to diffuse the information given in that letter throughout the scientific community in the United States.

Very respectfully, yours,
A. D. Bache,
One of the Secretaries, Am. Philos. Soc.

Somerset House, Apartments of the Royal Society, London, August 3*d*, 1833.

Sir,—I am honoured with the commands of his Royal Highness the President of the Royal Society, to acquaint you, for the information of the American Philosophical Society, at Philadelphia, that his Majesty, the King, has been pleased to grant two gold medals of the value of £50 each, to be awarded by the Royal Society on the day of their anniversary meeting in each succeding year, for the most important discoveries in any one principal branch of physical and mathematical knowledge.

His Majesty having graciously expressed a wish, that scientific men of all nations should be invited to afford the aid of their talents and researches, I am accordingly commanded by his Royal Highness the President to announce to you, sir, that the said Royal Medals for 1836, will be awarded in that year; the one for the most important unpublished paper on Astronomy, the other for the most important

unpublished paper in Animal Physiology, which may have been communicated to the Royal Society for insertion in their Transactions, after the present date, and prior to the month of June in the year 1836.

For the present, and the two following years, the Council of the Royal Society, with the approbation of his Majesty the King, have directed the Royal Medals to be awarded for important discoveries or series of investigations published within three years previous to the time of award; and those for the year 1833, have been adjudged, the one to Sir John F. W. Herschel, for his paper on the investigation of the Orbits of Revolving Double Stars, inserted in the fifth volume of the memoirs of the Royal Astronomical Society; the other to Professor Decandolle for his investigations in Vegetable Physiology, as detailed in his work entitled Physiologie Végétale.

I have the honour to be, Sir,
Your most obedient servant,
Charles Cunig, *For. Sec. Roy. Soc.*

To the Secretary of the American
Philosophical Society, Philadelphia.

PATENT CAUSE.

Decision of the Supreme Court of the United States, on the effect of delaying to obtain a patent after an invention is completed; in the case of Joshua Shaw *versus* Joseph Cooper, *in January Term,* 1833.

Under a similar title we published the decision in the case of Pennock and Sellers *v.* Dialogue, at p. 184 of vol. iii, and we are indebted to the same friendly hand which furnished the materials of that report, for the aid which has led to the publication of the subjoined article. There are but few points of equal importance to real inventors with that of a correct understanding of what constitutes an abandonment of their rights, a question which had never been definitively settled in the decisions of our courts until that made in the case above alluded to. The principles there laid down are, in the present case, not merely confirmed, but extended, and their application more clearly shown. In England the utmost secrecy is requisite until a patent has been actually obtained, and although such is not the case in this country, the patent laws being in both founded upon the same principles, it follows that there must be an accordance in the practice under them, although, as in many other instances, our decisions are less influenced by mere technicalities than those of the English courts. There, a true and original inventor, although he may use all due diligence in applying for a patent, may be deprived of his right by the villany of a workman, or the indiscretion of a friend, to whom he has, from necessity, or in confidence, made known his invention; here, according to the most strict construction of the decisions in Sellers and Pen-

nock *v.* Dialogue, and in that which follows, it can be lost only by the actual negligence and wilfulness of the inventor himself.

Joshua Shaw obtained a patent dated 19th June, 1822, for "a new and useful improvement in guns and fire arms, which improvement consisted in a priming head and case applied to guns and fire arms, for the purpose of priming and giving them fire by the means or use of percussion, fulminating, or detonating, powder:" which patent was surrendered on account of defects in the specification, and a new one issued, under an amended one, on the 7th of May, 1829, for the residue of the term of fourteen years from the first date. At the October term of 1829, Joshua Shaw instituted a suit against Joseph Cooper, for an alleged violation of his patent; the amended specification being put in by the plaintiff as the true description of his invention.

The points upon which the defendant relied were, that the pretended improvements were not made by Shaw; that they had been known and used in the United States, and in England, France, and other foreign countries, before the alleged discovery of them by him; that the essential parts of them was the invention of some person in England; that the patent was void because there was no discrimination between those parts which were new, and those which were old; and because the invention was not described in such full, clear, and exact terms, as are required by law, and because it was obtained surreptitiously.

The cause was tried in January, 1832, and a verdict and judgment given for the defendant.

On the trial in the Circuit Court, the plaintiff adduced testimony to prove that he had made the invention or discovery in 1813 or 1814; that not being himself a worker in iron, he, in 1813 or 1814, employed his brother, in England, under injunctions of secrecy, to make the apparatus necessary for experimenting with; that he left England in 1817, to reside in the United States, soon after which, his brother divulged the secret, for a reward, to a gunmaker in London; that he, the plaintiff, treated the invention as a secret after his arrival in this country, and that it was never publicly known here until after the date of his patent of the 19th June, 1822. Testimony was adduced to show that the principal importers of fire arms in New York and Philadelphia, had not heard of the thing at the time of the date of the patent, and that no guns of the kind were imported until the year 1824 or 1825. That letters patent were granted in England on the 11th of April, 1807, to one Alexander J. Forsyth, for a method of discharging fire arms by the use of a priming of percussion powder, merely by a blow; and it was contended that the existence of this patent to Forsyth, which gave to him the exclusive right to use the percussion powders in any mode, down to April, 1821, accounted for the plaintiff not taking out a patent in England; and that up to the time of his obtaining his patent here, he was engaged in experiments for the purpose of perfecting his invention.

The defendant proved by the testimony of one witness that he had used the improvement in England, had purchased a gun of the kind there, had seen others use them, and had seen guns of the kind in

the Duke of York's Armory in 1819; it was also proved by five other witnesses who had worked at the business of making guns, in England, in 1820 and 1821, that it was in general use there in those years, but they had never seen such at an earlier date; that in 1821 it was generally known and used in France; and in the United States after the 19th of June, 1822.

The foregoing contains the main points in the bill of exceptions; the case was submitted to the Supreme Court on printed arguments, by Mr. Paine on the part of the plaintiff, and Mr. Emmet for the defendant. We do not think it necessary, in our summary, to notice some of the points introduced by the counsel, as not bearing upon the question of the originality and novelty of the invention, but principally upon the fact of the plaintiff having been an alien at the time of his obtaining his patent in the first instance.

On the part of the plaintiff's counsel it was contended that the alleged public use was not such as to invalidate the claim of the patentee; that there were stronger instances of public use in the reported cases, in which patents had, nevertheless, been sustained, the inventor not having been considered as thereby abandoning his claim to the public; that at the time of taking out the patent, the invention had never been heard of here; that it had been known and used in England only two years, which was a foreign use, and would not have been an extraordinary one had it existed here; that the public here could sustain no injury by the existence of the exclusive right, they never having been in possession of the invention; that if an invention has been pirated, or fraudulently divulged, the inventor does not thereby lose his right, unless he acquiesce in the public use of it to such an extent as to prove by his neglect, that he has abandoned it to the public, and that in this case there was no evidence of such neglect; that the delay was accounted for by the plaintiff being engaged in the attempt to improve his invention; and that his not obtaining a patent in England resulted from the existence of Forsyth's patent there.

For the defendant it was contended that the public had, *somehow*, become fully possessed of the invention for two years before the plaintiff took any steps to secure a patent; that there was evidently both *negligence and unreasonable delay*, which was not invalidated by the pretence that the plaintiff was *maturing* his invention; as he at last took his patent for the very thing which had been in use for two or three years previously, both in England and France; that the delay was unnecessary, and amounted to an abandonment of his invention; that the thing being new here was not sufficient, as the settled law is that it must be *new to the world*.

The opinion of the Supreme Court was delivered by Mr. Justice M'Lean, which after a recital of the general facts of the case, and the citation of the legal authorities which bear upon it, concludes in the following terms:—

The patent law was designed for the public benefit, as well as for the benefit of inventors. For a valuable invention, the public, on the inventor's complying with certain conditions, give him, for a limited

period, the profits arising from the sale of the thing invented. This holds out an inducement for the exercise of genius and skill in making discoveries which may be useful to society, and profitable to the discoverer. But it was not the intention of this law, to take from the public, that of which they were fairly in possession.

"In the progress of society, the range of discoveries in the mechanic arts, in science, and in all things which promote the public convenience, will be enlarged. This results from the aggregation of mind, and the diversity of talents and pursuits, which exist in every intelligent community. And it would be extremely impolitic to retard or embarrass this advance, by withdrawing from the public any useful invention or art, and making it a subject of private monopoly. Against this consequence, the legislature have carefully guarded in the laws they have passed on the subject.

"It is undoubtedly just that every discoverer should realize the benefits resulting from his discovery, for the period contemplated by law. But these can only be secured by a substantial compliance with every legal requisite. His exclusive right does not rest upon his discovery alone; but also upon the legal sanctions which have been given to it, and the forms of law with which it has been clothed.

"No matter by what means an invention may be communicated to the public, before a patent is obtained; any acquiescence in the public use, by the inventor, will be an abandonment of his right. If the right were asserted by him who fraudulently obtained it, perhaps no lapse of time could give it validity, but the public stand in an entirely different relation to the inventor.

"The invention passes into the possession of innocent persons, who have no knowledge of the fraud, and at a considerable expense, perhaps, they appropriate it to their own use. The inventor, or his agent, has full knowledge of these facts, but fails to assert his right: shall he afterwards be permitted to assert it with effect? Is not this such evidence of acquiescence in the public use, on his part, as justly forfeits his right?

"If an individual witness a sale and transfer of real estate, under certain circumstances, in which he has an equitable lien or interest, and does not make known this interest, he shall not afterwards be permitted to assert it. On this principle it is that a discoverer abandons his right, if, before the obtainment of his patent, his discovery goes into public use. His right would be secured by giving public notice that he was the inventor of the thing used, and that he should apply for a patent. Does this impose any thing more than reasonable diligence on the inventor? And would any thing short of this, be just to the public?

"The acquiescence of an inventor in the public use of his invention, can in no case be presumed, where he has no knowledge of such use. But this knowledge may be presumed from the circumstances of the case. This will, in general, be a fact for the jury. And if the inventor do not, immediately after this notice, assert his right, it is such evidence of acquiescence in the public use, as for ever afterwards to prevent him from asserting it. After his right shall be

perfected by a patent, no presumption arises against it from a subsequent use by the public.

"When an inventor applies to the Department of State for a patent, he should state the facts truly; and indeed he is required to do so, under the solemn obligations of an oath. If his invention has been carried into public use by fraud, but for a series of months or years he has taken no steps to assert his right, would not this afford such evidence of acquiescence as to defeat his application, as effectually, as if he failed to state that he was the original inventor? And the same evidence which should defeat his application for a patent, would, at any subsequent period, be fatal to his right. The evidence he exhibits to the Department of State is not only ex parte, but interested; and the questions of fact are left open, to be controverted by any one who shall think proper to contest the right under the patent.

"A strict construction of the act, as it regards the public use of an invention, before it is patented, is not only required by its letter and spirit, but also by sound policy. A term of fourteen years was deemed sufficient for the enjoyment of an exclusive right of an invention by the inventor; but if he may delay an application for his patent at pleasure, although his invention be carried into public use, he may extend the period beyond what the law intended to give him. A pretence of fraud would afford no adequate security to the public in this respect, as artifice might be used to cover the transaction. The doctrine of presumed acquiescence, where the public use is known, or might be known, to the inventor, is the only safe rule which can be adopted on this subject.

"In the case under consideration, it appears the plaintiff came to this country, from England, in the year 1817, and being an alien, he could not apply for a patent until he had remained in the country two years. There was no legal obstruction to his obtaining a patent in the year 1819; but it seems that he failed to apply for one until three years after he might have done so. Had he used proper diligence in this respect his right might have been secured, as his invention was not sold in England until the year 1819. But in the two following years, it is proved to have been in public use there, and in the latter year, also in France.

"Under such circumstances, can the plaintiff's right be sustained?

"His counsel assigns as a reason for not making an earlier application, that he was endeavouring to make his invention more perfect; but it seems, by this delay, he was not enabled, essentially, to vary or improve it. The plan is substantially the same as was carried into public use through the brother of the plaintiff in England. Such an excuse, therefore, cannot avail the plaintiff. For three years before the emanation of his patent, his invention was in public use, and he appears to have taken no step to assert his right. Indeed he sets up, as a part of his case, the patent to Forsyth, as a reason why he did not apply for a patent in England.

"The Forsyth patent was dated six years before. Some of the decisions of the Circuit Courts, which are referred to, were overruled in the case of Pennock and Sellers *v.* Dialogue, They made the ques-

tion of abandonment to turn upon the intention of the inventor. But such is not considered to be the true ground. Whatever may be the intention of the inventor, if he suffers his invention to go into public use, through any means whatsoever, without an immediate assertion of his right, he is not entitled to a patent; nor will a patent, obtained under such circumstances, protect his right.

"The judgment of the Circuit Court must be affirmed with costs."

Process for the extemporaneous evolution of Iodine. Communicated by ROBERT HARE, *M. D., Professor of Chemistry in the University of Pennsylvania.**

Heat to the temperature of ebullition nearly, about two ounces of concentrated sulphuric acid, in a glass globe like that represented in the following figure.

It is preferable to have the whole of the globe heated by suspending it, with due caution, over a large charcoal fire. Then quickly transferring it to the iron tripod, previously heated, and furnished with a small bed of hot sand, throw into the acid about half a drachm of iodide of potassium, or sodium, sometimes called hydriodate of potash or soda. Instantaneously the cavity of the globe will become replete with the splendid violet vapour of iodine, which will soon after condense on those portions of the glass which are first refrige-

* Originally published in the Journal of the College of Pharmacy.

rated, in crystals symmetrically arranged, of great beauty, and unusual size.

It is perhaps more convenient, as respects the manipulation, to have the globe suspended by a crane, like that used for the suspension of large kettles, rendering it easy, by a circular motion, to swing them on, or off, the fire. By similar management the globe may be first kept over the fire till sufficiently hot, and then swung off to receive the salt. A method more attainable in the small way, is that of placing the vessel employed in a small iron skillet, in which it may be made steady by sand. Thus prepared, it may in the first place be conveniently held over the fire, and afterwards transferred to a table, and supported without removing it from the skillet.

Improved apparatus for showing the Spontaneous Combustion of Phosphorus in Chlorine. By the author of the preceding article.

In my Compendium, I have given an engraving and description of an apparatus for the combustion of phosphorus in chlorine, so contrived as to prevent the odious fumes from reaching the spectators.

Subjoined, will be found another apparatus, constructed about three years since, by which the process is rendered still more manageable.

Suppose a cylindrical glass vessel, (see figure annexed,) eight or nine inches in diameter, and about a foot in height, with a neck about four inches high, and one and a half inches in bore; the whole resembling a large decanter without a bottom. About the orifice of the neck, let there be cemented, air tight, a brass cap, surmounted by a stuffing box, and having on one side a hole communicating with the cavity of the neck; this aperture must be furnished with a thumb screw, by which it may be opened or closed at pleasure. Through the stuffing box, a copper rod passes, at the lower end of which a glass, or leaden, stopple is so affixed as to close the lower part of the neck, into which it is ground to fit air tight. Over this stopple, a cup of copper is soldered, so as to be concentric with the rod. The rod terminates above in a handle. Within the cup, let ten or fifteen grains of phosphorus be placed. This is easily effected when the cup and plug are depressed into the lower part of the cavity of the vessel, by a suitable movement of the sliding rod. In the next place draw up the cup and plug into the neck so as nearly, but not entirely, to close the neck, and sink the vessel into the water of the pneumatic cistern until all the air below the neck is expelled through the hole in the side of it, which is then to be closed by means of the screw, and the plug twisted and drawn into its place so as to be air tight. After filling the body of the vessel thus, with water, place it upon the shelf of the cistern. Chlorine may now be allowed to occupy three-fourths of the space within the vessel below the plug. The process being so far advanced, it is only necessary, at the moment when it is desirable to produce the combustion, to depress the plug, and of course the cup associated with it, containing the phosphorus, into the cavity replete with the chlorine. The phosphorus soon burns actively, although with a feeble light.

The increased temperature consequent to the combustion, causes the gas to expand, but not so much as to become too bulky to be retained.

In this case, the chlorine forms a chloride of phosphorus, which meeting with water, is decomposed into phosphoric and muriatic acids. By transferring the vessel, after it is supplied with chlorine, to a clean porcelain, or glass, dish, covered by pure water, the products of this combustion might be saved, and would of course increase in proportion to the quantity of phosphorus and chlorine employed. On a larger scale this process might be resorted to advantageously for the production of phosphoric acid, which is produced when the proportion of chlorine is sufficient; say four cubic inches for every grain of phosphorus.

FRANKLIN INSTITUTE.

Minutes of the Quarterly Meeting.

The thirty-ninth quarterly meeting of the Institute was held at their Hall, October 17, 1833.

William H. Keating, was appointed Chairman, and

William Hamilton, Rec. Sec. pro tem.

The minutes of the last quarterly meeting were read and approved.

Donations of books were received from Messrs. Andrew M. Jones, Henry Troth, Edward Needles, and Robert H. Smith.

The Corresponding Secretary laid on the table the various journals which had been received in exchange for the Journal of the Institute during the last quarter.

The Chairman of the Board of Managers read the thirty-ninth quarterly report of the Board, which was accepted, and, on motion, referred to the committee on publications, with instructions to publish such parts as they may deem expedient.

The treasurers report for the quarter ending October 10th, was read and accepted.

Professor Johnston informed the Institute of the decease of Warren Colburn, Esq., of Lowell, Massachusetts, when, on motion, it was

Resolved, That having recently learned the decease of Warren Colburn, Esq., this Institute, in common with other friends of the useful arts, feel a deep sense of their bereavement, and cherish a cordial sympathy with the friends and relatives of the deceased.

Professor A. D. Bache, called the attention of the meeting to a manuscript work, presented to the Institute by Mr. Edward Needles, of this city, and containing a description of a very complete instrument, invented by the late Mr. John Needles, for mechanical solution of the various cases in plane trigonometry, for the protraction of surveys, and kindred purposes. The instrument is called by the inventor a "Mathematical Trigonometer." The book contains the commendation of the instrument by Professor Robert Patterson and Wm. Waring, dated in 1793.

Quarterly Report of the Board of Managers.

The Board of Managers respectfully submit to the Institute their report for the past quarter.

The summer quarter includes but a small portion of the active operations of the Institution, and the Board have therefore merely to give an account of the items of business left unfinished at the date of their last report. The exhibition of domestic manufactures at the close of the quarter forms an exception to these remarks; but a detailed report in relation to it cannot be presented until all the results are accurately ascertained. These results will be submitted in the next quarterly report. In the mean while, the Board must congratulate

their fellow members upon the success of the exhibition; the improvement in the articles manufactured, and the increased number and variety of the products, give evidence of new and successful exertions on the part of our manufacturers and artisans. The public of our city have cheered us not only by a continuance of their interest, but by a very considerable increase in attendance over that of former years. It is estimated that not less than 50,000 persons have visited the exhibition of this year. The committee, it will be recollected, have made arrangements by which an address by the Hon. Daniel Webster, of Massachusetts, will be delivered on the occasion of distributing the premiums awarded to the successful competitors at the exhibition.

The collections of the Maclurean Lyceum, which it was stated in the last report had been transferred to the Institute, have been placed under the charge of the appropriate committees. The committee on minerals having considerable duty to perform to arrange the specimens which have thus accrued to their department, has been increased by the addition of C. B. Mathews, M.D., and Mr. J. A. C. Trautwine.

The committee on weights and measures have begun their duties by considering the steps taken by foreign countries and by the United States in arranging their systems of weights and measures; the committee have now before them the reports from their members furnishing the necessary information.

The labours of the committee on explosions in the branch of their inquiry directed to ascertaining the strength of materials of which steam boilers are made, have been continued, and will soon, it is confidently expected, be brought to a close.

The department of instruction has been efficiently arranged by the committee having charge of it. The lectures on Chemistry and Natural Philosophy will begin in the last week of this month; the opening introductory lecture will be on the 29th inst. The committee hope to be able to supply to the members, the course left vacant by the absence from the country of the lecturer on practical mechanics; arrangements will also be made for supplying the evenings left open for volunteer lectures. The Board would again call the attention of the members to the subject of these lectures, and invite them to the communication of the results of their practice or of study.

The drawing school will be opened on the 23d inst. under the charge of Mr. William Mason. The well known abilities of this gentleman as a teacher warrant the selection of the committee, and the recommendation of the school by the Board to the members of the Institute, and to the public.

The evening English School is already opened, and the board take this opportunity to express their undiminished confidence in the plan of instruction there pursued.

The treasurer's report is herewith submitted.

Since the last report the following persons have become life members of the Institute, viz. Isaac Lea, Charles Toppan, Saml. Hufty, A. C. Peixotto, Henry Paul Beck.

Respectfully submitted.

William Hamilton, *Actuary*. A. D. Bache, *Chairman*.

Fourth Monthly Conversation Meeting.

The Franklin Institute held their fourth monthly conversation meeting for this season at their Hall on the evening of Thursday, the 24th of October, at which Mr. Espy stated the result of experiments which had been made with a draught cap invented by him, and a model of which had been shown at a former meeting, upon the chimney of the furnace of the steam-boat pioneer, belonging to the Lehigh Navigation Company. The certificate of the captain and of the engineer of the boat, showed that for the same amount of work done the consumption of fuel had been diminished nearly one-fourth. This led to a discussion of the principles upon which an increase of effect might result from a less use of fuel when the draught was made more perfect.

One of the percussion locks, made under the direction of Captain Huger, of the U. S. Ordnance Corps, of which the drawings were exhibited at a former meeting, was placed upon the table for examination and trial.

Mr. Baldwin explained the movable diagrams of the locomotive engine constructed by him for the Philadelphia and Germantown railroad, showing the simplifications which he had made in the details of Stephenson.

A neat rotary pump for raising water, patented by Mr. P. Hubbard, of Vermont, was exhibited.

Report of the Committee on Premiums and Exhibitions of the Franklin Institute.

To the Board of Managers of the Franklin Institute of the State of Pennsylvania for the Promotion of the Mechanic Arts, the Committee on Premiums and Exhibitions respectfully report:—

That the eighth exhibition of American Manufactures was held at the Masonic Hall in this city, from the first to the fifth of October inclusive, during which time it was visited by a very large number of our fellow citizens. The receipts at the door of the rooms amounted to the sum of 1386 dollars and 26 cents, showing that upwards of eleven thousand persons paid for admission; if we add to this number the members of the Institute, the depositors of goods, and the persons permitted to be introduced by them, the whole number of visitors could not have been less than fifty thousand.

That our exhibitions continue to be highly appreciated by the public, is a source of satisfaction to the committee; but the most gratifying evidence afforded by this case, is the very general improvement in our manufactures, as asserted by the judges appointed to examine and report on the various articles in the collection. We have now afforded to us a striking proof that most of the articles of manufacture necessary to comfort, convenience, and even to luxury, can be produced by the skill and industry of our own artisans, affording a powerful addition to the means of independence possessed by our common country.

Strangers have frequently asked, when viewing the specimens submitted at our exhibitions, "are these of American manufacture?" evidently doubting the ability of the country to produce the articles before them, but when assured that none but American manufactures were permitted to be introduced, their doubts have been removed, their prejudices exploded, and they have carried to the various sections of our country, information and knowledge of the most beneficial kind, and their testimony of what they have here seen has, in many instances, been productive of useful results.

There is still another circumstance connected with this exhibition that affords substantial evidence of the prosperity of our manufactures. It is the great addition to the variety of articles produced: the specimens exhibited exceeded in number those of the seventh exhibition by one hundred and seventy-two, and, in several instances, for want of room, samples only, of articles which were required to be exhibited in quantities, could be displayed.

Annexed, the committee present a list of premiums, which they consider to be due according to the printed list communicated to the manufacturers previous to the exhibition. This list embraces the medals which it has been judged proper to award for articles not enumerated in the list just referred to, but which are considered by the judges to merit this mark of approbation. These premiums the committee request the Board of Managers to award.

On Cotton Goods.

1. Premium No. 58, is due to Peter H. Schenck & Co., of New York, for specimen No. 384, four pieces beaverteens, which are of a good and substantial quality, and adjudged to be much superior to most imported beverteens.

2. Premium, No. 61, is due to William Almond, of Philadelphia, for specimen No. 12, one piece of power-loom woven Marseilles, which is considered by the judges to be a very fair effort, and an evidence that the manufacturer has ability to produce a better article.

3. Premium, No. 63, is due to the Bristol Print Works, Rhode Island, for No. 55, ten pieces furniture chintz; the colours in these goods are vivid, and the patterns showy. In this article, the judges are of opinion, there is an evident improvement.

4. Premium, No. 64, is due to the Merrimack Manufacturing Company, Lowell, Massachusetts, for No. 263 and 264, thirty pieces rich chintz prints, of superior excellence in style, and displaying colours of great brilliancy.

5. Premium, No. 72, is due to Joseph Ripka, of Philadelphia, for No. 24 and 25, Cantoon crape and Cantoon Cord. These are exceedingly good imitations of the foreign article, and very durable and desirable goods.

6. Premium, No. 94, is due to the York Manufacturing Company, Albany, New York, for Nos. 53 and 54, forty pieces of brown and bleached Canton flannels, a superior fabric of uncommon regularity of nap, and presenting a beautifully smooth surface.

Honorary mention is due to William Wister, of Germantown, for

No. 205, five pieces of plate prints, at ten cents per yard; these goods are pronounced by the judges to be substantial and serviceable.

Woollen Goods.

7. Premium, No. 81, is due to the Great Falls Manufacturing Company, Somersworth, N. H. for Nos. 244 and 245, six pieces blue cloths, at three dollars per yard. These goods are pronounced to be well made and well finished.

8. Premium, No. 95, is due to David Knowles, of Blockley, Pa., for No. 11, seven pairs woollen and cotton blankets. Of these goods the judges say that they deserve unqualified commendation; the article appears to combine warmth with lightness, and the union of the two materials for that purpose, accomplishes a desirable object.

9. Premium, No. 92, is due to the Buffalo Woollen Manufacturing Company, Buffalo, N. Y., for No. 524, Wilton super blankets. These are not surpassed by any article of blanketing which has ever been seen by the committee of judges, the whiteness and fleecy character of the fabric deserves especial notice.

10. Premium, No. 80, is due to Wethered & Brothers, of Baltimore, for No. 457, one piece of superfine blue cloth, which is well made, and in the opinion of the judges the best specimen in the exhibition.

11. No. 82, is due to the Great Falls Manufacturing Company, for Nos. 239, 240 and 242, fancy colours broad cloths: the dye is adjudged to be good, the texture fine, and the finish free from objection.

12. Premium, No. 83, is due to Samuel Slater & Sons, of Webster, Massachusetts, for drab and mixed cloths. These goods are highly commended for colour, texture and finish.

13. Premium, No. 78, is due to Churchill Houston & Co. of Groveville, N. J. for mixed sattinetts. Taking into view the quality of the wool of which these goods are manufactured, they are considered the best ever exhibited.

Honorary mention is due to the Middlesex Manufacturing Company, Lowell, Massachusetts, for No. 238, striped cassimeres, which for closeness of texture, and neatness of finish, are highly commended by the judges.

Honorary mention is due to Wethered & Brothers, of Baltimore, for No. 565, one piece of black cassimere. This is spoken of by the judges as being equal in all respects to any cassimere exhibited.

Honorary mention is due to T. R. Fisher, of Wakefield mills, near Germantown, for one piece double milled drab cassimere, which the judges pronounce to be a well manufactured, and a very superior article.

Honorary mention is due to H. Hudson, of Long Island, New York, for No. 272, one piece twilled felting for paper makers, which is adjudged to be a well made article, and appears to be adapted to the purpose for which it is intended.

Honorary mention is due to the Salmon Falls Manufacturing Company, New Hampshire, for Nos. 387 and 388, seven pieces brown

cloths. These goods are highly commended by the judges for lustre and richness of finish; they say they have examined them with satisfaction, and commend them with great confidence.

Carpets.

14. Premium, No. 87, is due to the Lowell Carpet Manufacturing Company, Massachusetts, for No. 29. Three pieces superfine ingrain.

15. Premium, No. 89, is due to John Humphreys, of West Farms, New York, for No. 31, four pieces Brussels. Speaking of these specimens of Ingrain and Brussels carpeting, the judges say these goods are of excellent quality and style, and satisfactory assurances have been received that they are exclusively of American workmanship throughout all the processes, from the raw material to the finished product of the loom.

Honorary mention is due to Wiley & Cooper, of Brooklin, N. Y. for No. 429, four pieces floor oil cloth, which are considered equal in quality to any now or heretofore exhibited, and superior in style, having a close resemblance to Brussels carpeting.

Honorary mention is due to the Lowell Carpet Manufacturing Company, of Massachusetts for the very rich display of Wilton rugs; these exhibited a very great improvement in this branch of manufacture.

The committee cannot forbear mentioning two very elegant tufted rugs, manufactured by Isaac M'Cauley, of Philadelphia; these are adjudged to be superior to any exhibited, and had they been deposited within the specified time, the award of a medal would have been recommended.

Silk Goods.

Honorary mention is due to the New York Dyeing and Printing Establishment, for No. 342, specimens of printing on silk handkerchiefs.

Honorary mention is due to James Heald & Harris, of Philadelphia, for Nos. 720 and 721, specimens of printing on silk handkerchiefs and crape shawls.

Honorary mention is due to Micajah Burnet, of the United Society of Shakers, Pleasant Hill, Kentucky, for a silk handkerchief. This article is well made, and from silk raised in their settlement.

Straw Bonnets.

16. Premium, No. 90, is due to Mrs. E. Henley, of Philadelphia, for No. 375, three straw bonnets. These are adjudged to be very superior in quality, and made with great neatness. It is to be regretted that the maker of the plat of which these bonnets are composed, cannot be ascertained by the committee, as an honorary mention of the individual is richly merited.

Honorary mention is due to Mehitable H. Sears, of Prescot, Massachusetts, for No. 492, a specimen of Leghorn braid for bonnets; this is commended by the judges as worthy of high praise.

Honorary mention is due to Mrs. Jane L. Seddinger, of Philadel-

phia, for No. 491, one Leghorn bonnet: much taste has been displayed in the making up of this bonnet.

Honorary mention is due to the Pennsylvania Institution for the Deaf and Dumb, for No. 441, a straw bonnet made by the pupils of that institution, from the raw material; the judges think this a very creditable specimen of this species of manufactures.

Iron and Steel.

Honorary mention is due to the proprietors of the Cumberland Iron Works, Tennessee, for their specimens of rolled iron. The judges pronounce this article as fully comparing with the English chain cable iron, both for strength and ductility.

Surgical Instruments.

No specimens of surgical instruments were exhibited, except those manufactured by Wiegand & Snowden, and as Mr. Wiegand is a member of the Board of Managers, the judges are precluded from noticing them.

Honorary mention is due to Joseph M'Ilhenny, of Philadelphia, for No. 460, a case of artificial teeth: these teeth, the judges say, deserve a favourable notice for the perfection of their forms, the excellence of their colour, and the great smoothness of the enamel.

Hardware.

17. Premium, No. 25, is due to Isaac Babbet, of Taunton, Massachusetts, for No. 61, twelve specimens of tinned cast iron hollow ware. The judges are of opinion that these are equal to any thing of the kind they have ever seen imported.

18. An extra premium is due to M. H. Webster & L. C. Beck, of Albany, New York, for No. 51, seven cast iron skillets, coated inside with porcelain: these specimens were much admired, and are a favourable evidence that the maker of them is about to introduce a new and very desirable article.

19. Premium, No. 30, is due to Holmes, Hotchkiss, Brown & Elton, of Waterbury, Massachusetts, for several bundles of brass and copper wire: these are reported by the judges to possess all the qualities of a good article.

20. No. 34 is due to Dunlop, Madeira & Co. of Chambersburg, Pennsylvania, for No. 64, edge tools for carpenters and joiners. Of these articles the judges remark that " they are not only well formed, but well finished; the best specimens of the kind heretofore exhibited, and, as far as they are able to judge, the quality will correspond with the shape, form, and finish of the specimens."

21. An extra premium is due to T. & B. Rowland, of Philadelphia, for No. 86, five shovels, highly commended for their good qualities.

22. An extra premium is due to William Rowland, of Philadelphia, for No. 410 and 414 inclusive, an assortment of mill, cross-cut, tenon, and pit saws; these are adjudged to be first rate articles, and the best exhibited.

23. Premium No. 26, is due to Seth Boyden, of Newark, N. J., for No. 8, various specimens of malleable cast iron. Of these the judges express the opinion that their malleable and tenacious qualities are equal to any imported articles.

Honorary mention is due to Crocket & Boyden, of Newark, N. J. for No. 552, various specimens of malleable cast iron: these are adjudged to be quite equal to the last mentioned articles, but were not exhibited in quantity sufficient to compete for the medal.

Honorary mention is due to T. V. Blackmore, of Philadelphia, for No. 162, two japanned waiters. The japanning of these goods does credit to the artisan, and shows a great improvement on those exhibited on a former occasion; had the waiters been made here of American sheet iron, a medal would have been awarded.

Honorary mention is due to John Garret, of Philadelphia, for No. 6, a card of Dental files, of which the judges remark that they are equal to the English.

Honorary mention is due to David Bassett, of Derby, Connecticut, for No. 44, twenty-five screw augers. These are an excellent article, and, to every appearance, of a superior quality; the workmanship reflects credit on the manufacturer.

Honorary mention is due to J. M. L. & W. H. Scovill, of Waterbury, Conecticut, No. 124, a specimen of plated metal. This is pronounced to be an excellent article; it can be made as cheap as the imported, and in sufficient quantity to supply the demand.

Honorary mention is due to Rockwell & Hensdale, of Winchester, Connecticut, for No. 284, nine scythes: these are a specimen of good workmanship, and equal to those imported.

Honorary mention is due to the proprietors of the Mill Dam Foundry, near Boston, for Nos. 474 to 476, seven dozen plane irons, to every appearance a first rate article: the judges express a hope that all planes hereafter exhibited may be finished with American manufactured irons.

Honorary mention is due to Robinson Jones & Co., of Attleboro', Massachusetts, for No. 368, one case of gilt buttons: this is a specimen of well finished goods, and of superior gilding.

Models.

An honorary mention is due to J. Millington, of Philadelphia, for models of the steam engine: the execution of these models was remarkably neat, and one of them attracted particular attention from its finish.

Philosophical Apparatus.

An honorary mention is due to Alva Mason, of Philadelphia, for various articles of philosophical apparatus, which the judges are of opinion fully sustain the high character which Mr. Mason has attained in this branch of business.

Honorary mention is due to Josiah Loring, of Boston, for three globes deposited in the exhibition: of two of these it is remarked by

the judges that the execution of the maps is good; their covering of varnish remarkably smooth and transparent, and the mounting generally well executed; the third, with an "ivory surface," is particularly commended.

Honorary mention is due to John Marshall, of Philadelphia, for apothecary's balances, the workmanship of which, it is said by the judges, to be very creditable to Mr. Marshall.

Rifles.

24. Premium, No. 6, is due to Jacob Kunz, of Philadelphia, for No. 716, a rifle combining the usual good qualities, with excellent workmanship and finish, and at a fair price.

Lamps.

25. Premium, No. 19, is due to C. Cornelius & Son, of Philadelphia, for the best and most extensive variety of lamps; the mantel lamps were particularly admired, the brass castings are graceful, and exhibit a great richness of hue. The bronzing is decidedly superior to that of former specimens.

26. An extra premium is due to the New England Glass Company, Boston, for their glass mantel lamps. The cut pillars, icicles, and other pendulous ornaments, of these splendid lamps, are the first of the kind presented to the public from American sources, and they bear a strict scrutiny for transparency, lustre, and workmanship.

Honorary mention is due to J. W. & E. Kirk, of Philadelphia, for several lamps and other articles of anthracite coal: these are considered as showing a great improvement over similar articles reported upon at the last exhibition.

Musical Instruments.

27. Premium, No. 24, is due to Thomas Loud, of Philadelphia, for the best square piano, the cabinet work of which is of oak, the growth of the United States.

Honorary mention is due to Nunns, Clark & Co., of New York, for a square piano, the cabinet work of which is of maple. Of the qualities of this instrument the judges remark that it and that made by Mr. Loud, are so nearly equal that they experienced difficulty in deciding between them.

Honorary mention is due to E. N. Scherr, of Philadelphia, for a square piano, which was adjudged to be the best instrument of the kind presented at the exhibition. It is, however, said to possess an advantage over the others from the fact that the treble part was three stringed.

China, Glass, and Queensware.

28. An extra premium is due to the Boston, and Sandwich Glass Company, for No. 216, various specimens of pressed glass: these the judges think have very considerably improved since our last exhibition.

29. Premium, No. 16, is due to F. A. Marston, of Baltimore, for the best cut glass, which is reported by the judges to be equal to any similar article they had ever seen imported, for form, accuracy of cutting, brilliancy of colour, and highly finished polish.

Honorary mention is due to the American Pottery Company, of Jersey City, for specimens of American queensware. This article the judges esteem the best specimens of the kind they have ever seen of American manufacture.

Honorary mention is due to Joseph Hemphill, of Philadelphia, for No. 76, various samples of American porcelain, in the moulding and glazing of which great improvement has been made since the last exhibition; the body of the article is considered equal, if not superior, to that of the imported.

Marble.

30. Premium, No. 101, is due to Malloch, Purves & Malloch, of Philadelphia, for two mantels, entirely of Pennsylvania clouded marble, beautiful specimens of material, well matched, firmly put together, and highly polished, considered by the judges the best in the exhibition.

Honorary mention is due to Peter Fritz, of Philadelphia, for two mantels of the same pattern as the preceding pair, of good marble and workmanship.

Hats and Caps.

Honorary mention is due to A. Russel, jr. & Co. of Philadelphia, for several specimens of hats and caps; these are considered very creditable to the manufacturers, and the hats would have been entitled to the premium could the terms to supply the requisite quantity have been complied with.

Honorary mention is due to Thomas Elmes & Co. of Philadelphia, for specimens of silk hats and fur caps: these are considered very well and handsomely made, and in all respects entitled to commendation.

Honorary mention is due to Joseph Chandler Smith, for specimens of black fur hats, No. 559, adjudged the best in the exhibition for the price.

Books and Stationary.

Honorary mention is due to Wm. F. Geddes, of Philadelphia, for Nos. 533 and 545, specimens of printing in gold, silver, and bronze: these are adjudged to be very elegant and creditable evidences of the advanced state to which the typographic art has arrived in our country.

Honorary mention is due to Desilver, jr., Herse & Lindsey, of Philadelphia, for No. 320, a Journal and Ledger, the binding of which is executed in a very superior manner, and the ruling and faint lining, the judges declare to be the best they have ever noticed.

Honorary mention is due to James M. Porter of Easton, Pennsylvania; for specimens of school slates, manufactured by him from the quarries in Northampton county, Pa.

Paper Hangings.

Honorary mention is due to Beaty & Arey, of Philadelphia, for various specimens of paper hangings, which show an evident improvement in this branch of manufactures.

Shoes.

Honorary mention is due to Samuel D. Breed, of Philadelphia, for his gum elastic shoes with leather soles cemented to them: the judges are of opinion that by this invention the only disadvantage attendant on the use of these over shoes is completely obviated.

Fine Arts.

31. An extra premium is due to William J. Mullen of Philadelphia, for two gold watch dials. These, which are said to be the first successful attempt to compete with foreigners in this branch of the mechanic arts, are highly deserving of notice, for beauty of workmanship, chasteness of design and elaborate finish.

32. An extra premium is due to Asa Spencer, of Philadelphia, for specimens of medal ruling: these splendid imitations give to a flat surface an appearance of all the relief possessed by the best medals, and in so perfect a manner, as not to be distinguished from them, without the nicest scrutiny.

33. Premium, No. 85, is due to S. R. Mason, of Philadelphia, for the best perspective drawing of machinery: the judges speak of this in terms of high commendation, both for the faithfulness of the design, and the excellence of the execution.

Honorary mention is due to Wm. D. Parish, of Philadelphia, for a perspective drawing of an electrical machine. A very beautiful performance, which reflects credit on the artist.

Honorary mention is due to William Newlan, of Philadelphia, for specimens of mould carving, which exhibit excellent workmanship, and must prove highly acceptable to all concerned in ornamental casting.

Fancy Articles.

Honorary mention is due to John Yard, jr., of Philadelphia, for No. 428, a case of fancy pearl work: the judges recommend these articles to particular notice, for the skill displayed in a new branch of manufacture, and the comparatively low price for which the articles exhibited are sold.

Honorary mention is due to the Institution for the Instruction of the Blind, Philadelphia, for Nos. 579 and 580, six baskets and one guard chain: these are considered worthy of notice from their intrinsic merit, and still more so, from the proof they afford of the great

value of the benevolent institutions under whose auspices they have been sent to the exhibition.

Honorary mention is due to the United Society of Shakers, of New Lebanon, New York, for a variety of useful articles manufactured by them, and deposited by Gideon Cox.

Premiums were offered for several articles, of which models and specimens were exhibited, but as they require more time to test their utility than has elapsed since the exhibition, the committee have omitted to enumerate them, but will submit a separate report on those subjects, so soon as the judges shall have reported to them.

From the great extent of the catalogue of the exhibition, the committee are reluctantly compelled to omit mentioning in their report many valuable and interesting articles which enriched the collection; but as the reports of the judges will probably be published, which in many instances treat of the articles in detail, and speak of them with justice and candour, it is believed that a more particular report from this committee would be unnecessary.

The medals which are recommended by the committee to be awarded by the Board, they believe can be procured, without difficulty, in time to be distributed to the successful competitors, at the delivery of an address for which the Board have made arrangements.

In closing their report, the committee would do injustice to their own feelings, were they to omit mentioning the great obligations, which they, in common with the Institute, are under to the numerous friends who so promptly responded to their request, to act in conjunction with them, as a committee of arrangement; their attention to the arrangement of the rooms, and the manner in which the goods were displayed, deserve commendation and thanks.

To the gentlemen who undertook the delicate and difficult task of judges, the committee feel themselves also under great obligations; the labour bestowed in their examination of the articles, and the impartiality of the decisions in relation to their merits, were highly creditable to the different committees.

The depositors of goods on this occasion have come forward with a spirit worthy of our highest praise; the considerable expense incurred in many cases in sending their productions to the exhibition, will, the committee trust, be more than compensated by the good effect produced on the public mind, by the rich display of the manufactures of our country, which such co-operation alone enabled the Institute to furnish.

All which is respectfully submitted by

Samuel J. Robbins, Isaiah Lukens,
William H. Keating, Alexander Ferguson,
Frederick Fraley, J. Henry Bulkley,
M. W. Baldwin, Alexander M'Clurg,
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Committee on Premiums and Exhibitions.

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AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN JUNE, 1833.

With Remarks and Exemplifications, by the Editor.

1. For a *Grist Mill;* Moses Chapman, Girrard, Erie county, New York, June 1.

The mill intended to be described is one of the portable kind; the so called description, however, would afford but little insight into its construction, and none into what is to be considered as the invention of the patentee. The drawing, which we suppose has been made from the model, is, therefore, our principal guide in forming any judgment of the affair.

The point in which this differs from the greater number of portable mills, although not from the whole of them, is, in there being three stones, the upper and lower of which are to be stationary, and the middle one only to be the runner; but three stoned mills, so far as we can recollect, have heretofore had the stones placed vertically, whilst in this they stand horizontally. This may be new, but even if it is both "new and useful," as it is not claimed, but is mixed up in the specification with girths, guides, drivers, bridge trees, and shoes, which are old, the patent does not secure any thing.

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2. For a *Machine for Pressing and Finishing Bricks;* Charles Hinkle, Allentown, Lehigh county, Pennsylvania, June 1.

The mould in which the brick is to be pressed is made of cast iron, and forms part of a carriage, which runs upon ways, to bring it under the part where the pressure is to be made. The pressure is given by means of a lever which is to be brought down by hand. This lever is fixed to an horizontal axle, and has a progressive cam which operates upon a friction roller on the top of a follower. When the brick has been pressed, and the carriage is drawn out, the follower is raised by the action of levers contrived for that purpose; these levers also raise an iron plate, which forms the bottom of the mould, and thus delivers the brick from it.

The claim is to "the *combination and arrangement* of the several parts of the before described machine, and not to the individual parts themselves, as they have been long known and used."

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3. For a *Planing Machine;* Benjamin Kugler, city of Philadelphia, June 3.

The machinery here patented is described with much care and minuteness, and the parts of which it is constituted are represented by a number of plans, sections, and perspective drawings, without which a clear idea of it cannot be conveyed; its general action is as follows—

The plane, which is of metal, is firmly fixed, and is provided with a number of irons, placed one behind the other; the first of these is

set rank, to operate as a jack plane, and the succeeding ones have different degrees of hold. Irons intended for grooving are also set edgewise, in the same metallic plane. In the drawing, six irons are represented, one behind the other.

The board to be planed is drawn, or rather driven, through the machine, under the plane irons. This is effected by means of an "endless plate chain," which passes round cog wheels at each end of the machine; upon the top of this plate chain the boards are to be placed, and by it they are carried under the planing, and between the grooving irons.

There are proper fixtures for preventing the springing of the board, and for various other purposes, many of which being considered as mere matters of arrangement, are not claimed by the patentee. The things claimed are "the holding box, and the machine in which the board is prevented from bending, breaking, or swerving from its proper direction, and free ingress given to it into the planing box, while the force for pushing it through is applied to the dog at the end of the board. The construction of the planing box, and the combination and arrangement of the bits therein, and the mode in which the friction is diminished by the arrangement of the reverse angles."

We are not informed respecting the final success of this machine, but we know that it has been put up with much care and at great expense. The main difficulty which presents itself to us is one which we have before had occasion to express in relation to planing machines with a large number of irons acting simultaneously on a great width of surface; it seems to us that the resistance to be overcome is too great, especially when boards are hard, crossgrained, and knotty. The hand humours such boards, but the machine waits not to accommodate its customers, according to their different dispositions, but treats all alike. The patentee we know to be a gentleman of much ingenuity and perseverance, and we shall be gratified to hear that these attributes have enabled him in this case to triumph over all difficulties.

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4. For a *Horse Power for propelling machinery;* Charles Keller, city of Washington, D. C., June 3.

The lever to which the horse is attached is fixed to the vertical shaft af a cog wheel, and the teeth of this take into an endless screw formed upon a horizontal shaft which carries a band wheel, or whirl, a strap from which may be extended to drive machinery. The cog wheel, and the horizontal shaft which it drives, may be placed below the horse walk, and the apparatus be thus confined to a small space, and rendered portable. The claim made is to "the application of the well known principle of the endless screw and cog wheel to a portable horse power for driving machinery."

The advantage expected to result from this application is the obtaining the required speed by no further gearing than that described. The difficulty to be apprehended is from the great friction to which the endless screw must be subjected, which, if the materials are not

extremely hard, and the rubbing parts are not constantly supplied with unguents, must soon wear it out.

The application of the endless screw to a portable horse power, is, we believe, new; it, however, has been used for driving bolters in flour mills, and for other purposes. Nairne, a well known philosophical instrument maker, of London, manufactured, about sixty years ago, many globe electrifying machines, which were turned by a toothed wheel, acting upon an endless screw, one of which we formerly owned.

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5. For a *Machine for Dressing Hemp and Flax;* Hezekiah Hawley, Louisville, Jefferson county, Kentucky, June 4.

Much pains are taken in this specification to explain the construction and operation of the machine, in the most exact manner, yet notwithstanding this, and although we have read it through with some attention, our ideas are not quite clear upon several points relating to it; the description, we think, has been laboured into obscurity. Leaving the manipulation, which is the heaviest portion of the specification, we will merely observe that the flax to be dressed, is confined between the bars of an iron clamp, which embraces its ends, and which is of the length of the dressing roller. The hemp, of course, should be spread evenly the whole length. It is then to be passed between the edge of a straight bar of iron, and the revolving beaters, which consist of four straight bars attached to a revolving iron roller.

There is a number of other appendages which we have not named, and could not describe without figures. After presenting us with the whole machine, the description terminates without any claim; we are therefore left to suppose that the entire arrangement is considered by the patentee as new.

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6. For *Manufacturing Butt Hinges* of brass, copper, or other metal; Henry P. Anderson and Josiah Sawyer, Waterford, Saratoga county, New York, June 18.

These hinges are to be made of sheet metal, which is first to be cut into strips, and then drawn through a plate which bends the two edges round so as to form a tube. The opening in the draw plate consists of two holes, united by a slit, or opening, equal to the thickness of the metal. When drawn, the strip is to be slit along the middle, and then cut into lengths by circular cutters.

A machine, called a rotary joint cutter, is employed to form the knuckles, and is constructed as follows. Two wheels of iron, which may be a foot in diameter, and in thickness equal to the length of the hinge to be made, are placed upon a horizontal shaft. Kerfs are made into these wheels, across their faces, to a depth sufficient to receive the hinge plate. These may be an inch, or more, apart. The cutters which form the joints stand in front of, and revolve close to, these wheels, and receive a rapid motion, whilst that of the wheels must be such as to admit of the pieces being slipped, by hand, into the kerfs, or notches, which hold them while they are cut, and from which they fall after passing the revolving cutters.

"Many parts of our machinery and tools are not new, but we claim as our discovery, the drawing of the metal through dies rolling the edges over, for manufacturing butt hinges. The machine for cutting out the joints, which we call a rotary joint cutter, we claim as our invention. In these two consist the main advantages of our mode of manufacturing butt hinges. On these we rest our claims as to our new and useful improvements, but have given a description of the other parts of the process, so as to enable the public to have the benefit of them."

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7. For a *Machine for Cleaning, Softening, Separating, and Shortening, the Fibres of Hemp and Flax;* Ezekiah Hawley, Louisville, Jefferson county, Kentucky, June 29.

The main part of this machine consists of two iron rollers, from two to four feet in length, and from two and a half to six inches in diameter; these are to be made so as to run one above the other, the upper one being borne down by weights. There is another roller, by which the flax or hemp is conducted between the iron rollers operating as a kind of feeder to them. When the ends appear from between the rollers they are turned up and made to wind round the upper one, where the quantity proper to be operated on at once is kept revolving until the breaking is completed. The material is then to be removed by a card, or some similar contrivance, and the fibres to be cleaned. When the flax or hemp is first wound on, the motion of the rollers is to be slow, after which it is to be much accellerated.

This constitutes the whole operation, and the machinery has the credit of great simplicity, to which if it add that of efficiency, the invention will be a valuable one. There is no claim made, the principle of breaking by such a machine being considered as essentially new. It differs materially from that patented by the same gentleman on the 4th of the month, although the two machines are for the same purpose.

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8. For a *Lavender Balsam for preserving and restoring the human Hair;* Elizabeth Bartlett, city of New York, June 29.

Two quarts of flax seed are to be boiled in three of rain water, until reduced to one-third of the quantity, when the mucilage is to be strained; four quarts of whiskey are then to be added, together with two ounces of oil of lavender.

This *balsam* is to be applied morning and evening by the aid of a hair brush, and we are told that one quart will suffice to restore hair to the bald pate, and one pint to prevent the catastrophe, after it has commenced falling off.

We have no doubt that this balsam will do quite as much good as the far famed Macassar oil, provided it can be sold at as high a price; if it is sold cheap, however, we do not believe that it will be of much use either to the patient or the doctor.

9. For an improvement in *Leather Cutters;* Joseph S. Bishop, Wayne, Kennebeck county, Maine, June 29.

This machine is for slitting strips of leather so as to reduce them to a thickness for saddlery, harness, &c. A knife is to be fixed like that of a spoke shave; a spring is to bear upon the leather to keep it down as it passes under the knife, and the leather is to be drawn through by rolling it round a shaft turned by a crank in the rear of the knife.

The claim is to "the permanent knife; the spring; the shaft; the power applied to this purpose; and, in fine, the invention of the whole machine."

Machines for this purpose, with permanent knives, have been long known and used; we can answer for them for nearly thirty years, and they are not therefore the subjects for a patent. If any claim could, in this case, be sustained, it must be to the particular arrangement of the parts as adopted by the patentee, the general plan being old.

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10. For *Making Splits for Baskets;* Joseph L. Border, Shrewsbury, Monmouth county, New Jersey, June 29.

The splits, or strips, are to be sawed, by circular saws, from any tough kind of wood. This constitutes the whole process, the advantages of which are said to be a saving of wood and labour, and the formation of a stronger, more compact, and better basket.

If the greater part of these advantages are gained, they may suffice; we are not prepared to believe, however, that sawed strips, which must, to some extent, be cross-grained, can be stronger than split ones.

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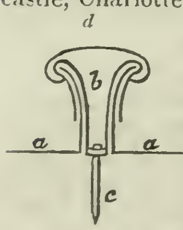
11. For an improved mode of *Covering the Roofs of Buildings with Sheet Tin and other Rolled Metals;* Charles Bonnycastle, Charlottesville, Albemarle county, Virginia, June 29.



The method here patented is intended to obviate the effects of the expansion and contraction of the metal, which has not been effectually done by the plans most generally pursued. The sketch in the margin is a section of the joinings of the plates, along the plane of the roof, from the eaves to the ridge. The plates *a a* have their edges turned up, and curved a little out; the plate *b* is a strap which is formed of a strip of tin bent over so as to embrace the edges of two contiguous plates, and is nailed down between them by a nail *c*. A tubular piece, *d*, covers over them, and forms a capping that effectually prevents the introduction of rain.

The claim is to the above described mode of fastening sheets of tin, and other rolled metallic plates, to the roofs of buildings; and to the prescribed mode of covering the joints.

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12. For a *Machine for Cutting Hemp, Flax, and also*

grains and grasses of various kinds; Thomas A. Anderson, M'Minn county, Tennessee, June 22.

This machine is to run upon four wheels, two of them, we suppose, may be of the ordinary size of large carriage wheels, the other two about one-third of their diameter. The large wheels are fixed upon an axle which revolves with them, and upon the inner side of one of them, there are cogs, which drive a wheel turning on a vertical shaft running in the frame work of the machinery; this last wheel takes into one on a horizontal shaft, elevated above the large wheel; this horizontal shaft extends along towards the other end of the carriage, and has on its end a vertical wheel which turns a vertical shaft reaching nearly down to the ground; a scythe or cutter is secured to, and extends out at right angles from, the lower end of this shaft, and as it revolves is to cut the grains, or grasses, in its course.

There is no claim, the patentee probably not being aware that any similar attempts had been made to mow with apparatus of this kind; there have, however, been many machines acting upon similar principles, though varying in form from that above noticed, but the objections to them all are so numerous that after a brief existence, they have made their exit.

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13. For a *Portable Horse Power;* Samuel Allen, Saratoga Springs, Saratoga county, New York, June 29.

This machine, like most of the portable horse powers, has the gearing of wheel work below the lever, or sweep, to which the horse is to be attached. There are three wheels and three pinions, upon suitable shafts; the last shaft being a horizontal one, and passing along close to the ground, where it is boxed, or covered, to prevent injury from the feet of the horses; at its extreme end it has a whirl, from which a band is to extend to operate upon any machinery. The main point claimed is the mode of making the wheels, which are to consist of iron rims, with arms of wood. The iron rims are to be strengthened by a flanch, which projects inwards, and serves also as a bearing for the wooden arms.

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14. For an instrument for *Cutting Bungs, or Stoppers, for Beer or other Barrels;* Robert Barlow, city of Philadelphia, June 29.

This instrument is a hollow punch, made exactly like those used for cutting the wadding of guns, and which have frequently been made larger for other purposes. In the present instance, it must, of course, be of the size of the required bung, and this must be cut endways of the wood.

We doubt the validity of any claim to such an instrument, because it is not new; but admitting the claim to the instrument to be *good*, we more than doubt its making bungs which will be so. The carbonic acid will escape through the bung; this we know from experience, and it might be known without it, as the wood consists of a series of tubular vessels extending longitudinally. The form of the

bung also, will be objectionable; it will be cylindrical, whilst it ought to be conical.

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15. For a *Machine for Spinning Silk;* Adam Brooks, Scituate, Plymouth county, Massachusetts, June 29.

This machine is intended to draw the threads from the cocoons, and unite them without reeling, in sufficient numbers to carry them over a cylinder to spindles, where they are spun into a thread ready for filling in weaving, or for doubling and twisting for sewing silk. The apparatus, as represented, is simple, and the patentee avers that it facilitates the business of preparing the silk in various ways, "drawing the fibres from the cocoons by a steady motion, breaking the fibres less than by reeling in the common way: without loss from splitting or tangling; much firmer, smoother, stronger, and more even than by any other method, and with greater despatch."

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16. For an improvement in the *Construction of Iron Bridges;* Augustus Canfield, Paterson, Essex county, New Jersey, June 29.

This is a chain bridge, and is, on the drawing, called a tension bridge. It is represented as having a span of eighty feet; and as having two string pieces, or chains, one above the other, in a straight line, or rather *arching a little upwards.* The upper and lower string pieces, as shown in the drawing, are ten in number, and the links are of course eight feet in length; they are to be of wrought iron; the distance between the upper and lower string pieces is also represented as eight feet. Vertical bars connect the upper and lower string pieces at each joint, thus dividing the whole into squares of eight feet; diagonal braces, pointing from the centre towards the abutments, are placed in each of the squares; these braces are to be of cast iron. There is no claim made, but "the inventor believes this to be the best arrangement of the materials that can be made." He also remarks that "in this construction, the stress upon each part by any given pressure, is a matter of simple calculation;" we are apprehensive, however, that a correct calculation would not confirm the opinion that this is "the best arrangement of the materials which could be made;" we, however, leave it to others to institute the inquiry, for which we will readily find room in our pages.

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17. For a *Machine for Thrashing Grain;* Stephen Norton, New Lebanon, Columbia county, New York, June 29.

The claims made to the improvements in the thrashing machine, are to "the mode of constructing and hanging the beaters; the formation of the concave, and the manner of causing it to recede when fed too fast." Neither of these alterations can be considered as changing the character of the machine as it previously existed; the beaters are to be of the swinging kind, fixed to the heads by a bolt passing through eyes at the ends; but instead of a single eye at each end, the present patentee puts two, embracing each side of the plate of which the head is formed; this alteration, were it new, would produce the

same advantage, and be as worthy of a patent, as a fifth wheel to a coach. The concave is, as usual, to be made to recede by the action of springs, but the iron with which it is armed is put on to it in a way somewhat differing from the ordinary mode.

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18. For a machine for *Cutting the Tenons or Spokes for Wheels;* Pitner Emmitt, Hopewell, York county, Pennsylvania, June 29.

A vertical piece, called a driver, is to be forced down by a lever, it being made to slide truly through openings in the frame work of the machine. On the lower end of the driver, four cutters are to be fastened by screw bolts; two of these are to cut the shoulders, and two the sides of the tenon, the spoke being held upon a bed, or cutting block.

We have on a former occasion made some remarks upon a similar mode of cutting tenons, which was made the subject of a patent, and by turning over our pages could furnish day and date; but as we do not think the plan a good one, the interference does not present itself as a question of much importance. There are but few workmen who will require argument to induce them to believe that circular or other saws, adopted in former tenoning machines, are much better than the cutters above proposed; although it would be difficult to convince them that in most kinds of stuff tenons could be well cut by it.

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19. For *Machinery for Forging Axes;* David Hinman, Canton, Hartford county, Connecticut, June 29.

Although this is termed a machine for forging axes, there is not a word in the description of it which applies any more to this particular business, than it would to a hundred others.

The machine described is to act as a powerful press, which is to be used to force the heated metal into the proper form by placing it between dies. A particular press is described, but this is only given as one which the patentee approves, and he expressly says that a powerful press of any of the common constructions may be employed. He claims "the application of a powerful press of the above or any of the more common constructions, operating on dies, moulds, or swages, in a direct, or nearly direct, manner, to give to the heated iron and steel the several forms which are successively requisite in forging it into all kinds of axes."

We have uniformly maintained the opinion that a patent cannot be sustained for the mere application of a well known process, or machine, to the making of a new article. If a machine must undergo some particular modification to enable it to perform a new process, or if there is any thing peculiar in the mode of operating with it, there is then invention, and of course novelty, but not otherwise.

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20. For *Boxes for reducing Friction in Mill Gudgeons;* Frederick Eichelberger, Creagerstown, Frederick county, Maryland, June 29.

The gudgeons of mill shafts are to run upon a large roller, in a suitable box; and there are to be two smaller lateral rollers to sustain the gudgeons sideways. "The foregoing box, wheel, and roller," are the things claimed, and those who buy a right, will not, we presume, thereby forfeit that privilege of using them, which they already have.

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21. For a *Hill-side Plough,* called the "hinged wing hill-side plough;" William B. Donald, Rockbridge county, Virginia, June 29.

This hill side plough, like several which have preceded it, has two mouldboards, and two shares, above which the beam is made to swivel upon a bolt, so that the horses may be turned, carrying the beam round, without moving the body of the plough. There is a sliding ferule which is to be displaced and replaced by a rod, every time the beam is turned; its use is to clasp the lower part of the plough to the beam. This appears to be rather an awkward contrivance, and very inferior to some which have been previously adopted in similar ploughs. The part relied on by the patentee is what he denominates a *hinged wing.* The mouldboards are, in their fore parts, like those in common use, but they terminate abruptly, the piece called the hinged wing serving to make out the hind or terminating part of either mouldboard. This hinged wing is a plate of cast iron, turning on a bolt like a hinge; we are told by the patentee that it is very easily managed, but it requires time to determine this point; the dirt, stubble, and blows, to which a plough is subjected will be likely to interfere with the free action and permanence of the movable parts.

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22. For a *Chimney Cap* for increasing the draft in furnaces of steam-boats and locomotive engines; James P. Espy, city of Philadelphia, June 29.

(See specification.)

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23. For a *Machine for making Rivets, Heading Screws,* and performing other similar operations; Thomas W. Harvey, Jamestown, Chataque county, New York, June 29.

This machine is too complex to admit of its being described in words, or even with drawings, without presenting a number of its parts separately. As it is intended for the making of large rivets, such as those used for tanks and steam engine boilers, which require considerable force in the formation of their heads by pressure, the movements for this purpose, as well as for cutting off the bars, are mostly effected by means of toggle joints. In making rivets of the smaller kind, heading screws, and other operations which do not require the upsetting of a large portion of metal, the wire, or rod, does not require to be heated; but for boiler rivets, this must be done, and on this account provision is made for allowing water to run upon the dies to prevent their being softened by the heat.

The machine is described by references to the drawings throughout, and the specification concludes in the following manner,—" Most of

the parts which I have described, and represented, are not, when taken individually, new; but I have so combined them as to give to the whole a peculiar character, and to produce an effect which is new and useful. It is therefore upon the general arrangement and combination of the parts by which this machine is distinguished from all others which have been constructed for similar purposes, that I found my claim to a patent. In the individual parts, however, I claim the particular construction of the cam No. 1, as described and represented. I also claim the arrangement of the toggle joint by which the shears are opened and closed by the vibration of the bar marked *f* in the drawing."

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24. For *Machinery for Sawing Circular Forms or Figures from Wood;* Levi Hitchcock, Springfield, Hampden county, Massachusetts, June 29.

The machine described consists, mainly, of a circular saw, which is to be concavo-convex, or, in other words, to be a segment of a hollow sphere, suiting the curvature of the article to be cut. The saw is to be fixed upon an axis, like other circular saws, and the stuff to be cut fed to it by suitable fixtures which gauge and guide it. The claim made is to "the application of the circular saw to the cutting and shaping of circular forms, such as coach and wagon felloes, and all sorts of circular work for carriages and chairs; and to the method of adapting the shape of the saw to effect this object."

It is said that pieces should be cut out of the circular plate, forming notches half an inch, or more, wide, extending from the periphery some way in towards the centre, which will facilitate the raising of the plate into the proper form; this, we suppose, is what is intended by "the method of adopting the shape," &c.

It appears rather singular that the articles to which this mode of sawing is better adapted than to most others, is not at all mentioned in the specification, that of staves, which require to be rounded in every direction, as stuff cut by such a saw will necessarily be; perhaps the cause of this omission may be found in the fact that a patent was obtained by Philip Cornell on the 11th of April, 1832, for sawing bulging staves with a plano-convex saw, such as is above described, (see vol. x. p. 236.) It is a mistake, however, to suppose that another man's machine can be taken and applied to a new purpose, and thus become the subject of a new patent; yet this is all that is attempted in the present instance.

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25. For a *Grooving Machine to form the Grooves for Pannels*, either in straight, or in curved work; David H. Hanson, Weare, Hillsborough county, New Hampshire, June 29.

The grooving is to be effected by a cutter, which stands out from the end of a vertical spindle, running in collars, and made to revolve by means of whirls and bands. The cutter operates something like a drill, or auger, having edges on its end and its two sides; its diameter must be equal to the width of the groove to be cut: there are rests

or guides to direct the stuff, which is held in the hands, so that whether curved or straight, by forcing the stuff on, the groove shall be regularly cut. This machine, it is said, works at least seven times as rapidly as any one previously used for the purpose. The claim is to "the spiral cutter, or groover, and the combination or arrangement of the machinery to effect its use."

The combination of the machinery has nothing in it new, or necessary to the action of the cutter, as other, and better arrangements, may be easily made; this, however, will not affect the use of the cutter. The size and construction of a frame for sustaining the apparatus is given with all the minuteness which might be required in mathematical admeasurement, whilst they are things which every workman would make equally well, although deviating in every particular from the directions given.

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26. For an *Improvement in the Anthracite Coal Stove, by closing the ash pit, illuminating the front, and transferring the door to the top thereof;* Eliphalet Nott, Schenectady, state of New York, June 29.

This is the first of a series of eleven patents, the remainder of which will follow the account of this, in regular succession, as they were all applied for and issued at the same time.

Our readers will recollect the notices of three patents previously obtained for Dr. Nott's stoves for the combustion of anthracite; and among those who live in our cities there are but few who have not seen them in actual operation. The greater number of these new patents are taken for the individual improvements which in their combined state are to be found in the stove as it already exists. The reason for obtaining these several patents, we have been informed, is the frequent invasion of the right of the patentee by manufacturers who adopt one or more of his improvements in their stoves, and seem to think that this may be done with impunity, provided they do not take the whole. Although, in this point, they are grossly mistaken, it has been thought better to exhibit each of the parts as patented in its individual character; for should this procedure not secure the rights of the inventor more perfectly, it has been supposed that it might serve as a beacon to invaders, and thus prevent the necessity of resorting to the courts of law.

We shall do but little more than give the claims set up in these new patents, as in so doing we must occupy quite as much room as we can conveniently devote to an individual subject, and ask quite as much from our readers as most of them will be willing to give.

The claim appended to the specification of the patent, the title of which is given above, is in the following words.

"I therefore claim as my improvement the illuminating of the front of an anthracite coal stove, and the providing of access thereto vertically, for the admission of fuel, and the use of the poker, by combining in front a vertical grate, and an exterior sash for mica, or other transparent substance, with an opening at top governed by a door or

lid, and this whether the closed ash pit, with its inlet for air, governed by a valve, or an ash drawer operating as a valve, be added to the foregoing combination or not, though such addition is preferred; together with the uses to which said combination has been, or may be applied."

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27. For the *Construction of Sashes for Mica, in the front of Coal Stoves;* Eliphalet Nott, Schenectady, New York, June 29.

Claim. "I claim as my invention and improvement the making use of cast iron as aforesaid; together with the uses to which the same has been or may be applied."

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28. For an improvement in the *Construction of the Vertical Grate, and the manner of combining therewith the sash for mica, and the inlet for fuel, in an anthracite coal stove;* Eliphalet Nott, Schenectady, New York, June 29.

Claim. "I therefore claim as my invention and improvement in anthracite coal stoves, having their inlet for fuel at top, the preventing of the falling out of ashes, and the warping of the front grate, by dividing the same vertically into sections as aforesaid, and whether so divided or not, by combining the same with its illuminating sash in front in the manner above set forth: together with the uses to which said improvement has been, or may hereafter, be applied; irrespective of the inlet for fuel at top, and irrespective of every other provision with which the same may be combined in stoves or furnaces of any sort."

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29. For an improvement in *The Lining between which and the front plate, the flue for the ascent of air, and the descent of ashes to the ash pit, is formed in anthracite coal stoves;* Eliphalet Nott, Schenectady, New York, June 29.

Claim. "I therefore claim as my invention and improvement, the preventing of the warping, and the facilitating of the removal of the lining aforesaid, by the making use of a movable, in place of a fixed, plate therefor; and that whether the same consist of one entire plate, or several separate sections; and the combination thereof with the vertical front grate, and its exterior sash for mica, with a flue between the two as aforesaid; together with the uses to which the same has been, or may hereafter be, applied in stoves or furnaces."

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30. For *Preventing the escape of Heat from the top of a pile of ignited fuel, by placing over the same a movable flat;* Eliphalet Nott, Schenectady, New York, June 29.

Claim. "I therefore claim as my invention and improvement, the preventing of the escape of heat from the top of a pile of ignited fuel, contained in a chamber of combustion constructed as aforesaid, by combining therewith a movable flat: the same being placed over said

fuel, and left free to descend thereon, as aforesaid; together with the uses to which the same has been, or may hereafter be, applied."

31. For an improvement in the *Construction of Tops for Stoves, by a combination of sections cast separately;* Eliphalet Nott, Schenectady, New York, June 29.

CLAIM. "I therefore claim as my invention and improvement for preventing of the tops of stoves from cracking, the casting the same in sections, or dividing the same into sections when cast entire, and thereafter combining said sections in one whole, as aforesaid, together with the uses to which the same has been, or may hereafter be, applied in stoves or furnaces."

32. For *The material, combination, and confinement, in place of the damper and handle, as employed in common stove pipe;* Eliphalet Nott, Schenectady, New York, June 29.

CLAIM. "I therefore claim as my invention and improvement, the preventing of the warping and corroding of dampers and handles in common stove pipe, by making use of cast iron in the construction of the same; and when so constructed, in combining and retaining the same in place, in manner aforesaid; together with the uses to which the same has been, or may hereafter be, applied in stove pipe."

33. For the *Construction and adjustment of the brick forming the flue, and employed in confining the combustion to the base of the fuel, contained in anthracite coal stoves;* Eliphalet Nott, Schenectady, New York, June 29.

CLAIM. "I therefore claim as my invention and improvement, the providing for removing and restoring the front of flue aforesaid, by shortening the brick or other slabs of which the same is composed, so that they will freely enter the caliber of the chamber, and by projecting from the right and left jamb brick, the requisite truss or other fixtures for sustaining and confining the same in place as aforesaid; together with the uses to which said improvement has been or hereafter may be may be applied in stoves and furnaces."

34. For the *Material form, and construction of stove pipe, to be employed where anthracite coal is the fuel in use;* Eliphalet Nott, Schenectady, New York, June 29.

CLAIM. "I therefore claim as my invention and improvement, the securing of the draft; the increasing of the conducting and radiating power of the flue, and the preventing of the speedy destruction of the flue itself, by making use of rough cast iron pipe combined as aforesaid, in the form of hollow parallelopipeds, in place of smooth sheet iron pipe, in the form of hollow cylinders, for so much thereof as it may be desirable to employ for giving off the requisite heat to the room; together with the uses to which the same has been, or may be hereafter, employed in stoves and furnaces."

This last concludes the series of nine patents appertaining particularly to the stove for the combustion of anthracite. Although we believe that there is, in most of them, sufficient novelty upon which to sustain a patent, we think, that as respects some of them, this point is, at least, a doubtful one; but the utility, merit, and originality of the stove into the composition of which they enter, does not depend upon this circumstance: this is a point which we believe the courts, and public opinion have both settled in favour of the patentee.

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35. For *Increasing the evolution of heat from anthracite coal, and for rendering the whole heat evolved from fuel of any sort, available to the production of useful effect in the treatment of bodies at rest;* Eliphalet Nott, Schenectady, New York, June 29.

(See specification)

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36. For improvements in the *treatment of metallic bodies, and of bodies generally, as well those that admit of motion while under treatment, as those that require to be at rest;* Eliphalet Nott, Schenectady, New York, June 29.

(See specification.)

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37. For a new *Apparatus for the Study of Astronomy;* James Swaim, city of Philadelphia, June 29.

This instrument consists of a hoop, or ring, something like the horizon of the artificial globe, being divided, like it, into twelve parts, for the signs, and each of them into thirty, for the degrees. The ring is to be placed vertically, upon a stand, and a wire is to rise from the stand, to its centre, bearing on it a small terrestrial globe. The divisions of the degrees are each to be perforated, to receive a pin, having attached to it a block representing one of the planets, which may be changed from one hole to another, according to the places of the planets in the eclipse. The hoop can be made to revolve round the ball, and this, we are told, represents exactly the apparent motion of the planets round the earth. If you suppose yourself at the top of the earth you are thereby to "tell at what o'clock any planet will rise, by observing where the sun is when the planet rises." The places of the planets may be found in almost any almanac.

This is the whole instrument, claim, invention, and discovery.

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38. For an *Inkstand;* Ezra Southworth, Saybrook, Middlesex county, Connecticut, June 29.

A phial is to be let into a piece of wood, where it is to be surrounded by cotton, or some other soft substance, calculated to keep it from breaking, and from freezing; this being fixed you are to plug up the hole with a piece of wood; then "varnish and bronze it, and you have an elegant and useful, and durable, ink stand, better than has heretofore been used."

"The setting the phials in wood, and securing them from breaking or freezing, by means of cotton, wool, flax, hemp, charcoal, or any other material which has that tendency, I claim as an entirely new improvement in the making of inkstands." The employment of cork has been very conveniently omitted, for although better than most of the articles named, it has been long known and used.

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39. For a *Mode of Raising and Lowering Tide and Current Water Wheels;* Charles F. Paine, Winslow, Kennebeck county, Maine, June 29.

The apparatus which is described is of a character rather more complex than appears to us to be necessary for the object in view, more so, in fact, than many which we have seen. The frame work which sustains the wheel is to project over a wharf, or other suitable place on the shore. The wheel is to run at the extreme ends of two vibrating beams, which are hung upon their centres; the interior extremity of these beams is capable of being raised or lowered by the machinery described. Upon one side of the water wheel there is a toothed rim which takes into a toothed wheel having its axis on the frame, and this, in its turn, into one whose axis is on the centre, or fulcrum, of the frame, from which last axle motion is to be communicated to machinery by means of whirls and bands.

The claim is, very properly, made to the particular combination and arrangement of the parts described and employed by the patentee.

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40. For an improvement in the *Gun;* David G. Colburn, Canton, Onondagua county, New York, June 29.

This is to be a magazine gun, to fire from three to twelve times after being once loaded. There is to be a cylindrical magazine revolving on an arbor, and containing the required number of charges. The lock is to be so constructed that it will turn the magazine, and prime itself at the same time by pulling the trigger. The description of the apparatus is extremely obscure, and were we to contrive to pick out the parts which are represented in the drawing, so as to understand their uses, we should be unable to communicate the knowledge so acquired; and were we able to do so, the information afforded would, we apprehed, be of very little value, because we do not think the thing itself will ever come into use, nor, if brought into use, do we believe that it would much outlive an ephemeron. The claim is to all the parts employed in the lock for cocking, priming, and turning the magazine.

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41. For a *Thrashing Machine;* Daniel A. Webster, city of New York, June 29.

The part of the cylinder, usually called the beaters, differs essentially from those used in any of the numerous thrashing machines which have preceded it; at least so far as our knowledge extends, and we have been introduced to a host of them.

The rims or heads, which form the ends of the cylinder, carry four fluted rollers, extending from one to the other, having their axes on the peripheries of the heads, and the flutes straight, from one end to the other of the rollers.

The concave segment is formed of small rollers, or reeds, extended across it, and corresponding in size with the flutes upon the beater rollers. There is to be a space of about half an inch between the flutes and the reeds on the concave, thus allowing room for the straw to pass; the numerous flexures of which, in its passage, will, it is said, thrash or clean out the grain, whilst the motion of the rollers upon their axes in a direction the reverse of that of the cylinder, will allow the latter to revolve under less obstruction than usual. The invention, as claimed, consists in this construction of the cylinder and concave.

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42. For an improvement in roads, denominated the *Track Road;* John S. Williams, Cincinnati, Hamilton county, Ohio, June 29.

(See specification.)

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43. For the application to machinery of the *Power resulting from Explosive Compounds;* Henry Rodgers, New York, June 29.

The patentee boldly claims as what " he intends to patent, *the application of the power produced by the explosion of gunpowder or any other explosive compound, to machinery in general, whether in the form described or in any other that may suit better,*" and he then informs us that he intends to apply the power more especially to locomotive engines, and carriages to run upon common roads.

Although the whole specification consists of a description of the particular apparatus which is represented in a drawing, we do not think it necessary to follow this description, as the patentee does not himself claim the machine, but the *principle* of using expansive compounds in any way. As regards the machine we will merely observe that it contains a piston within a cylinder, which is to be forced up by the explosion of gunpowder, ignited by means of a hammer striking upon percussion powder.

Putting out of the question the schemes for perpetual motion, we could not call to our recollection a patent more essentially deficient both in form and substance than the one before us. In the first place the patent is taken for a naked principle, independently of any practical mode of applying it, which is not in itself patentable. In the next place, the idea of employing this principle has not the shadow of a claim to novelty; many essays have been made to employ the explosive force of gunpowder to the propelling of machinery, and after the expenditure of large sums of money, it has been abandoned as hopeless. As regards other explosive compounds, which are all embraced in the sweeping claims of the patentee, the records of the patent office both here and in Europe, might have admonished the present appli-

cant of the futility of such a claim. Brown's gas engine in England, and Capt. Morey's explosive engine, patented both there and in this country, are among the examples. The editor assisted in the performance of a number of experiments of the same kind, upwards of twenty years ago; and twenty years hence, when the present attempt shall have been long forgotten, the same phantom will again arise, and lead astray some new seeker after *unthought of* modes of driving machinery.

We are not prepared to say that there is not in nature any power better than that of steam, because we believe that our knowledge of the laws of nature, and the resources of art in applying them, will always be progressive; but we are fully convinced that this better power will not be the result of the firing of gunpowder, or of any other *explosive* mixture by which sudden and intermitting effects are produced.

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44. For a *Thrashing and Hulling Machine;* James Pearson, jr., Rush, Northumberland county, Pennsylvania, June 29.

The teeth on the cylinder, and on the concave are to be of cast iron. The concave is to consist of segments of cast iron rims, having teeth, or ledges on each side of them. These segments are to be placed parallel to each other, and at such a distance apart as shall allow long cast iron teeth, forming regular rows around the cylinder, to pass between them. The claim is to the mode of forming the cylinder and concave.

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45. For a *Fire Proof Soap Clay Covering for Roofs;* Hezekiah Steel, Hudson, Columbia county, New York, June 29.

Sheathing paper is to be saturated by placing it in a boiling hot mixture of rosin, tar, and whale oil, after which it is to be passed between rollers to force off the redundant material from the surface. A kind of soap stone clay, found in Hempstead Harbour, on Long Island, is to be ground with oil in the manner of paint, and then laid on the paper to the thickness of an eighth of an inch. This being left to dry for five days, will, according to the averments of the patentee, become hard, impervious to water, and entirely fire proof. The composition may, it is said, be applied like paint to a shingled roof, which will be thereby rendered fire proof.

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46. For *Forging Axes by Rolling;* Erastus Shaw, Canton, Hartford county, Connecticut, June 29.

The rolling machine is to be made with a frame like that of the common flatting mill, but the rollers are to project *outside* of the frame at one end, and this instead of the portion between the two ends of the frame, is to be the operating part. Holes, or recesses, are to be formed in these projecting ends to receive dies, or swages of any form that may be wanted.

The claim made is to "the application of rollers placed on the *outside* of the frame to the forging of axes of all kinds."

At p. 240, vol. xi. we have published Mr. Asahel Collins' specification of a patent for the same purpose, and although he does not propose to do his rolling on the *outside*, but between the standards in the part ordinarily used, his plan is the same with the foregoing in all its essential particulars. If Mr. Collins' patent is good, it is not to be got rid of, or evaded, by an alteration, the only object of which appears to be, to effect this purpose, as the contrivance is without the slightest claim to invention or discovery; an invasion against which the law has absolutely provided, and which no court of *justice* would sanction, were no such provision made.

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47. For an improvement in *Locks for Doors;* William How, city of New York, June 29.

This lock is to be made in most respects like the common door lock, but there are to be five, or any other number, of cylindrical pieces, which are called drums, ranged on the side of the bolt, and made in such a way that excepting they are all placed in the proper direction the bolt cannot be turned by the key. The drums may be of brass, about one inch in diameter, and three-eighths of an inch thick: a spindle passes through each of them to retain them in their places, and to receive the pipe of a key by which they are to be turned. They have each of them a groove on one edge to admit a wing projecting from the bolt to pass through, when rightly placed for that purpose, but they stop its motion when not so placed. The door must have a round key hole for each of these drums, in order to their being turned in the proper position preparatory to unlocking the door with the ordinary key. When unlocked, pieces projecting from the bolt cover the ends of the pins by which the drums are to be turned.

The point claimed is "the movable indices applied to door and other locks as above specified."

We do not perceive the superiority of this lock to many others which have been devised for special security, and we think that the adjustment of the five drums will exact more attention than most persons will be willing to give, excepting during the period when they are satisfying their curiosity concerning them.

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48. For an improvement in the *Distillery;* Henry Beeker, Warwick, Lancaster county, Pennsylvania, June 29.

These improvements consist of such arrangements of the apparatus for distilling as it is supposed will economise fuel, by a more advantageous application of the heat than usual: the patentee says that by his mode of procedure one-third of the fuel ordinarily consumed, is saved. We cannot describe the whole of the proposed arrangements, several of which are without novelty, and as there is no claim made we cannot tell what it was intended to patent. The principal point in the arrangement appears to be the making a very long neck to the still, and the surrounding this by a tub to contain beer, which becomes heated both by the neck, and by steam tubes which pass from the still into the beer. A tube from the tub, or boiler, allows the beer, when ne-

cessary, to descend into the still, but before this takes place the spirit will, it is said, be half driven off, from it, by the heat which it has received.

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49. For a *Machine for Planting and Digging Potatoes;* Levi Rice, Robbinstown, Washington county, Maine, June 29.

Various uses are named to which this machine in question is to be applied, as, to furrowing, dropping, and covering, potatoes; digging them, and excavating the earth. It does not appear, however, that the machine, as represented, is calculated to produce all these effects; and the only claim made by the patentee is "the right of improvement of putting more wheels to the machine, and furrowing, dropping, and covering potatoes, and also for digging potatoes, and excavating the earth." Perhaps, however, we mistake the design of this claim, and that it is intended to use the machine for all these purposes in the form in which it is represented in the drawing; if so, like many others, it claims more than it appears calculated to accomplish.

A sort of frame is made, consisting of two side pieces, united to end pieces: this is to be drawn by one end, and near to the other it has two low wheels, connected by a revolving axle, and having spikes on them to enable them to take hold of the ground. On the axle is a roller, and near the front end of the machine, another, around which passes a revolving apron, consisting of parallel bars crossing the frame, and, we suppose, placed so near together that potatoes will not pass between them. At the front end there is a shovel, which may be depressed by raising levers: this shovels up the potatoes, and earth, and conducts them on to the revolving apron, in passing over which the earth is to be shaken out, and the potatoes are to fall into a box in the rear. Under the machine a share projects down for making a furrow, and behind it are two scrapers for covering this furrow with earth; of what use these appendages can be it is hard to tell, as there is no contrivance for dropping potatoes, or any thing else, into the furrow; this part, however, will probably be developed by the time the machine has arrived at maturity, as at present, this and other parts exist in embryo only, if at all.

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50. For an *Elevator Bucket;* Nelson C. Staples, Lynchburg, Campbell county, Virginia, June 29.

This bucket, which is to be substituted for those now in use in the elevators of flour mills, is to have ends of wood, about an inch thick, with their upper ends bevelled off to conduct the grain into the bucket. The remaining part is of sheet iron, and a bolt extends from one end to the other, in front of the sheet iron, and through the wooden ends, to confine them together. The buckets are to be attached to the strap by two strong screws.

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51. For a *Planting Machine, for making a ridge, opening it, and dropping cotton or other seeds;* John J. Goodman, and William S. M'Donald, Wilson county, Tennessee, June 29.

There is no small resemblance between this planting machine and several others which have preceded it, and there is not any thing in the specification setting forth the improvement supposed to be made. The ground is to be opened by a share; the seed is dropped from a hopper, the quantity discharged being governed by the motion of the wheels; and a contrivance in the rear of the machine is intended to close the ground over the seed. All these objects have been previously accomplished by contrivances very similar to those described by the patentees, who should, therefore, have shown clearly the points of novelty in their arrangement.

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52. For a mode of *Manufacturing Hose for the conveyance of Water, and for foundations of Machine Cards;* Samuel D. Breed, city of Philadelphia, June 29.

(See specification.)

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53. For a *Machine for Sawing Round Bodies from Logs, for Cooper's Ware, &c.;* Samuel Newton, Hamilton county, Ohio, June 29.

With a manifest intention of giving a full and exact description of this machine, it is rendered complex and obscure by a too precise designation of the size of the various timbers used, and the manner of framing them together. And although this description is accompanied by a very good drawing, there are no references whatever to it; it is no easy task, therefore, to connect the description with the thing described. We collect, however, from the whole, that the object is to saw out rims for cooper's work, of that kind which is not bulging, such as tubs, buckets, piggins, &c. The blocks from which they are to be sawed is round timber, which is to be centered, and fixed in the machine. A groove is to be cut into the block from end to end, reaching as near as may be to the centre, and of sufficient width to admit the saw, which must be made as narrow as it can be with convenience. The saw is worked by a crank motion, and the block regularly turned round by the machinery. The vessels are thus sawed one out of the other, and the opening closed by hooping. A vessel is thus formed which may be said to consist of a single stave, there being but one joint in the body of it.

The claim is to "the application of known principles in their combination. adaptation, and application, to the above purpose of making cooper's ware, or the bodies thereof, by the application of the saw in the groove of the round log, by which vessels may be formed with an opening in the side."

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54. For a *New manufacture of Wheels for Rail-road Cars;* Matthias W. Baldwin, city of Philadelphia, June 29.

(See specification.)

55. For an improvement in *Road Making;* John Hartman, Scottsville, Albemarle county, Virginia, June 29.

Logs are to be taken, and halved by sawing, or otherwise; or a sufficient portion may be hewed off from one side to give the required surface. These are to be laid lengthwise on the road, at such distance apart as shall correspond with the ordinary length of the axles of carriages. They may be notched into cross sills, and braced or fixed in various ways. Scantling may be bolted, nailed, or pinned, on either edge, or on both edges, of these rails, to keep the wheels on them.

"Any, or all, of these timbers may be put down with the bark on, or taken off by hewing, sawing, shaving, or burning; the latter of which is particularly intended, as adapted to last. This road is intended for all sorts of wagons, carriages, stages, &c. either drawn by horses, or propelled by steam; also for horses, cattle, &c., to be used up and down hills."

Such is the description of this invention, no part of which is claimed. Among the specifications for this month will be found one of a patent to John S. Williams, of Ohio, for a similar thing. The patents both bear the same date, but this does not determine the question of who is the *first inventor.* How long since Mr. Hartman devised and completed his plan, we have no means of knowing, but we have been for more than two years past in correspondence with Mr. Williams upon this subject; if the plans are, therefore, identical in principle, as we believe them to be, Mr. Hartman must be able to prove a date to his invention some considerable time back, or the ground he has occupied will be found subject to a prior claim.

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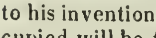
56. For improvements in the *Reacting Water Wheel;* John Ambler, Jr., Waterford, Saratoga county, New York. First patented February 2nd, 1833. Patent surrendered and reissued on an amended specification. June 29.

The former specification was extremely indistinct, leaving it at least very uncertain in what the improvement consisted; and as the kind of wheel intended to be patented cannot itself be claimed as new, the validity of any claim which includes the employment of it must depend upon its being confined to such improvements as are particularly designated. The general construction of the wheel is similar to that described in the patent of Mr. Wing, of which we have frequently spoken. The heads and buckets are to be cast in separate pieces, and screwed together by bolts which pass though the heads, and the body of each bucket. The buckets are cast thicker in the middle than elsewhere, something



like the sketch in the margin, the white part being hollow, and the dark spot showing the bolt which passes throught it. One of the outer curves is adapted to the rim of the wheel, the other bending in to form the opening for the discharge of water. The inner curve is a regular segment of a circle. The projecting rim which rises from the upper head, surrounding the hole for the admission of water, and

connecting the wheel with the flume, is cast in a separate piece, and is bolted to the head, through a flanch. The design of this is to allow of its being truly centered without the labour of turning it. This rim comes up close to the bottom of the flume, the hole in the lower end of which is of the same diameter with the interior of the rim. A hoop of leather is fastened round within the opening in the flume, by means of a rim, or hoop, of sheet iron; the leather descends below this, and into the rim of the wheel, where it operates as a valve; the water in the flume pressing upon it always keeps it in contact, whilst the wheel can still turn easily.

There is a gate to regulate, or to prevent, the admission of water into the wheel. This consists of a cylindrical tube open at both ends, its outside fitting to, and sliding vertically within, the opening in the flume and head of the wheel. When this tube is let down so as to come into contact with the lower head, the water can no longer find its way to the buckets; but when raised, it may flow more or less freely to them, in proportion to its elevation.

The improvements claimed are "the form of the bucket as above described; the method of securing the joint between the wheel and the flume by means of a movable rim, and sheet iron and leather, in the manner hereinbefore described; and the cylindrical gate, or tube, as above described."

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a patent for a mode of manufacturing Wood Screws; HAZARD KNOWLES, *Colchester, New London county, Connecticut. First patented April* 1, 1831. *Patent surrendered, and reissued on an amended specification March* 1, 1833.

To all to whom these presents may come, be it known, that I, Hazard Knowles, of Colchester, in the county of New London, in the state of Connecticut, have invented a new and useful improvement in the mode of manufacturing wood screws, of which the following is a full and exact description. The improvement which I have invented consists in the method of raising, or producing, the *thread* of the screw, which is done, not upon the principle of cutting out or removing the metal of the wire, or cylinder, upon which the thread is to be produced, so as to leave it standing in relief by means of a file, or any kind of edge tool whatever, but upon the principle of forcing the metal aside and driving up so as to constitute the spiral thread; and this is done by subjecting the wire or metal cylinder, upon which the thread is to be produced to pressure, while revolving between two oblong plates, or dies, of tempered steel, which are made to pass over, or by, each other in parallel lines, and of which each one has its face grooved or creased, in such a manner as to correspond with, and form a counter part to, the other, and so as to regulate and produce the thread upon the wire or metal cylinder as it is compressed between them, and made to revolve by their motion.

The grooved plates above mentioned may be of any thickness that will allow a crease or groove of sufficient depth to form the desired thread, and each plate may be welded, or otherwise fastened, to a bed or basis of iron, or other metal, which must be massive enough to sustain any degree of pressure that may be required in order to raise the thread, and they should be so long as to allow as many revolutions of the wire or cylinder between them as may be necessary to force up the thread to the desired sharpness and smoothness, and they must be of a width that shall at least equal the length of that part of the metal which is to receive the thread, the extent to which the wire is admitted between the plates being determined by experience, and adjusted, or gauged, by means of a set screw.

Both these plates, or dies, may move, or one may be kept in motion and the other at rest. They may be attached to, or connected with, any machine that is capable of producing the motion, and of sustaining the requisite pressure, and the motion may be given by a crank, or a cam, at pleasure, the plates being suspended or carried by any kind of bed, or carriage, traversing upon rails, or between ways; or, finally, one of the plates may be made convex and the other concave, and one of them may be attached to the periphery of a wheel, the other remaining at rest either above or below it, and the pressure being produced by a slight difference between the convexity of the one, and the concavity of the other, or by a little eccentricity of the winch upon which one rests and the other moves.

I prefer, and use, the reciprocating motion produced by a cam either in one or in both of the plates, and these I sometimes drive one over the other in a horizontal motion, the cylinder, or wire, laying horizontally, revolving between them, and sometimes one by the side of the other, the cylinder standing perpendicular as it revolves. The constructor may arrange them in such relative position as he may prefer.

Annexed is a drawing of *one* of the plates, or dies, the lines representing the ridges between the grooves or creases. These will always run obliquely, and for right hand screws they must rise as they run from right to left, the angle at the bottom being greater or less, and the lines themselves being more or less near to each other,

always being exactly parallel, according to the size of the cylinder and the fineness of the thread, the angle increasing as the thread increases in its gain and its size.

The grooves or creases in the face of each die must, of course, be deep, and the ridges between them sharp, according to the desired depth and sharpness of the thread; and one or both of the dies or plates must be so constructed that their faces shall gradually come to each other as the cylinder is carried between them, till it has reached about the middle of the plates, and from that point that their faces shall be parallel to each other during the rest of their motion, their motion being always in right lines, and the sides of the dies that correspond to each other, always moving upon the same line or upon parallel lines.

From about the middle of the plate, measuring from end to end,

the ridges between the grooves gradually become wider at the top, and the grooves more sharp at the bottom in order to leave the spaces between the threads of the screws broad at the bottom, and the threads themselves thin and sharp at the top, if it is desired to give the screw that form or curvature, and small transverse cuts run across the ridges, at right angles with the sides of the die, and quite near to each other, in order to prevent the cylinder from sliding between the dies, and to give it a revolving motion.

The plates, or dies, may be so arranged as to thread or form a screw in their motion either from right to left, or from left to right, or in each part of their reciprocating motion. The wire, or cylinder, is introduced at, or near, the end of one of the dies, and is seized by the other as it passes, and driven out at the other end, the screw being threaded or formed with entire accuracy, and with a degree of perfection that will always correspond with the fineness of the metal and the workmanship of the machinery.

What I claim as my invention, and for the use of which I ask an exclusive privilege, is the improvement in the mode of manufacturing the wood screw, which consists in the method of raising or producing the thread, by forcing up the metal of the cylinder, or wire, of which the screw is made, so as to constitute the thread by rolling and compressing the cylinder between grooved plates, or dies, of the foregoing description, by whatever machinery the dies are worked, and in whatever way the motion is given, or the pressure applied.

Hazard Knowles.

Specification of a patent for an improvement in the Construction of Roads, whereby some of the advantages derived from rail-roads are extended to common carriages of burthen or pleasure. Granted to John S. Williams, *Cincinnati, Hamilton county, Ohio, June* 29, 1833.

I lay two continuous lines of timber, or other suitable material, lengthwise, on said road, at such a distance apart as to form tracks for the wheels of such vehicles as are in general use upon the road so improved. I furrow, gutter, or groove, one of these tracks, in order to receive and guide the wheel, or wheels, on one side of the carriages travelling thereon. Those grooves, or gutters, may be made in the timber, or other material, before it is laid upon the road, or afterwards, either by hand or by machinery propelled by any suitable motive power, or they may be formed by attaching cheeks, or sides, to a plain surface.

The other track ought to be laid on a level with the bottom of the furrow, or gutter, above mentioned. Its face I make plain, and it ought to be of such a width as to allow for the variation of span sometimes given to the wheels of different kinds of carriages in some places, so that while the wheels of one side of the vehicles shall remain within the groove of one track, the other wheel shall remain on the face of

the other track, notwithstanding the different spans to which they may be constructed.

These tracks may be bedded, or laid, in, or upon, stone, gravel, clay, or any material of which the surface of the road is formed, and the piece of which they are constructed, may be connected by dowels, or clamps, or laid upon transverse blocks, or cross pieces, which may, or may not, extend from one to the other.

Scrapers may be attached to some of the carriages passing on said tracks for the purpose of cleansing them of stones, earth, or other matter, which might tend to obstruct the wheels, or injure the tracks.

Where there is much travelling upon a road so improved, I lay two sets, or four continuous lines, of tracks, one set for the going, and one for the returning carriages. This will be found most convenient; although to turn out of the tracks, when carriages meet, will not be attended with difficulty, as one side only of the turning out carriage would have to be raised over a small obstacle.

I am aware that some of the advantages of such a track road may be gained by laying timber, &c. as above, and by furrowing, guttering, or rebating, both tracks to guide the wheels, but I prefer to gutter, or groove, one only.

What I claim as my invention or improvement, is the laying of tracks of wood, or other suitable material, one of which shall be furrowed, grooved, or guttered, in the manner, and for the purpose, hereinbefore set forth.

John S. Williams.

Specification of a patent for an improvement in the Chimney Cap for increasing the draft in the Furnaces of Steam-boats, and Locomotive Engines. Granted to James P. Espy, *city of Philadelphia, June* 29, 1833.

To all to whom these presents shall come, be it known, that I, James P. Espy, of the city of Philadelphia, and state of Pennsylvania, have invented a new and useful improvement, which I call a draft generating chimney cap. for increasing the draft in the furnaces of locomotive engines and steam-boats, and for preventing the emission of sparks from their chimnies, and that the following is a full and exact description of the construction, application, and operation, of the said draft generating chimney cap, as applied to the above purposes by me. The drawing and model deposited in the patent office, represent a portion of the upper part of the chimney with the cap surrounding it, connected with a vane which may be either above or below, provided it is long enough to turn the angle of the cap always to the wind. This angle, it is believed, may vary from fifty to ninety degrees without materially varying the effect, whilst the angle of the upper covering of the cap, which slopes upwards from the wind, should be from forty to sixty with the horizon.

As the object is to produce a partial vacuum over the top of the

chimney, when the locomotive, or steam-boat, is in motion, it is manifest that the draft will be increased by enlarging the cap, both because the vacuum will be greater, and a freer egress will be allowed to gas from the chimney; and on this account particular care must be taken to have the upper covering of the cap so high above the top of the chimney as to allow a very free egress of the smoke from the chimney into the cap. In the cap which I have had made to test the theory by experiment, and which has been completely successful, a wire gauze so fine that a pin's head can hardly be thrust through the meshes, has been used, it is about thirteen or fourteen times the area of the top of the chimney, and thus affords a very free egress to the gases, whilst it completely stops the sparks. When it is in its place on the chimney the wire gauze stands perpendicular to the horizon, and the sparks after striking against it, finally fall down, and nearly leave the passage free. And it is hoped that, by making a few small holes in the lower plate of the cap, near the wire, to admit a small portion of atmospheric air, these sparks will burn, and thus save the trouble of cleaning out the cap by hand.

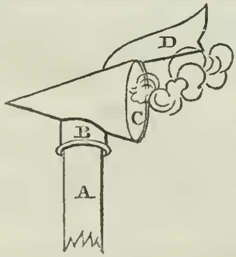
The cap should be so nicely balanced as to turn freely to the wind; at the same time it should fit so closely to the chimney as to let in as little air as possible into the cap, for every particle which thus enters diminishes the draft.

The cap itself is made of sheet iron, and the lower plate which goes round the chimney, and fits close to it, is horizontal, in the experiment model, and in the model deposited in the patent office; but any intelligent mechanic, who understands the operation of the machine in causing a partial vacuum, will easily know how to vary the proportions of the cap, without materially injuring the effect.

Where draft only is required, it may be made very strong by not using the wire.

What I claim as new in the above arrangement, is the application of a machine, which I call a draft generating chimney cap, to the top of chimnies in steam-boats and locomotive engines, to increase the draft by causing a partial vacuum over the top of the chimney, and thus permitting the use of a wire gauze to prevent the emission of sparks without materially diminishing the draft.

JAMES P. ESPY.



A, The chimney.

B, Neck of the cap.

C, Opening of the cap.

D, Vane.

Mr. Espy has received the following certificates of the entire success of his invention, and he feels satisfied that the most decided advantage will result from the adoption of it, not only by locomotives, but by steam-boats incommoded by ordinary sparks, and not having draft enough to bear a wire gauze at the top of the smoke pipe; for the draft cap and its wire gauze the draft will be much greater than their present smoke pipes afford. Mr. Espy will receive communications on the subject (post paid) at Philadelphia.

This is to certify that I have tried Mr. Espy's draft cap,on Mr. Baldwin's locomotive engine [on the Philadelphia and Germantown rail-road,] and that with a wire gauze so fine that the head of a pin could not go through the meshes, which was quite too fine; it effectually stopped the sparks, without diminishing the draft, and in some cases it even increased it, as, by opening the door to put in wood, the flame did not come out as it did previously in similar circumstances.

In short, it is the only machine which I think will completely answer the purpose of stopping the sparks, without diminishing the draft, that has yet been presented to the public.

October 7th, 1833. Wm. Knight, *Engineer.*

The cap has also been tried on a steam-boat which burns anthracite coal, and the following certificate of the decidedly good effect which it produces not only in insuring a great draft, but in saving fuel by burning the carbonic oxide under the boiler, which, without the cap, was burned above the top of the smoke pipe.

This is to certify that I have had in use Mr. Espy's draft cap on the steam-boat Convoy, for several months. This boat burns anthracite, and since the cap has been put on, nearly one-third of the coal we used to burn has been saved, and we make our trips in a fourth less time. The draft is very much increased, especially when we go against the wind, and the flame which always used to appear in the night rising above the top of the smoke pipe, eight or nine feet, has never but once appeared since the cap has been put on—and the smoke pipe which used to be red hot to the top, is not now red more than three or four feet from the bottom. Attention to the fires is also attended with less trouble than formerly; for previous to the use of the cap, we had to fill up with coal every ten miles, now we fill up only every seventeen miles, and as we always fill up to within four inches of the top of the grate, and carefully level, the quantity of coal used is known by actual experiment.

I may add that the steam is sooner got up at the wharf when there is any wind, and I know of no disadvantage attending the use of the cap, if it is well made, so as to turn freely to the wind.

James Devoes, *Engineer.*

Philadelphia, *October 5th*, 1833.

To this may be added the certificate of Joseph Watson, former mayor of the city of Philadelphia.

James Devoes, whose name is subscribed to the above certificate, has long been employed by the Lehigh Coal and Navigation Company, as an engineer, on board the steam-boat Convoy. He was regularly brought up to the business of making steam engines, and when a boy received from the Franklin Institute, a premium for his ingenuity and workmanship in the production of a small steam engine. I have great confidence in his ability and judgment, and believe that his certificate deserves entire credit.

JOSEPH WATSON, *President.*

Remarks by the Patentee.

The cap described in the patent is pyramidal, but as an equal vacuum will be formed whether a pyramid or a cone is employed, and as it has been found by experiment, since the patent was taken out, that a cone is a little stiffer than a pyramid, it is recommended in preference, and accordingly exhibited in the drawing.

The proportions given in this drawing are believed to be good, but they may vary considerably without materially injuring the effect. In these, the diameter of the smoke pipe is one, the mouth of the cap, or base of the cone, two, and the axis of the cone, three. Any one may easily satisfy himself of the effect of the vacuum produced by the operation of the cap, by making one of paste-board of the size of the drawing, and inserting a tube in the side of it; then by holding the end of this tube near the flame of a candle, and blowing on the vertex of the cone, he will see the flame of the candle rush with great velocity into the end of the tube. Indeed the velocity with which it rushes into the tube is greater than the velocity of the air passing the apex of the cone. For it is known by experiment that if the wind be made to blow against the mouth of the cap, that the air will blow down the tube with a greater velocity than the air has which meets the cap. And when the wind blows against the apex, it is believed that the effect is nearly reversed. This point, however, shall be determined by experiment, and the result laid before the public, with any other information on the subject which may be obtained in the progress of the investigation.

Specification of a patent for increasing the Evolution of Heat from Anthracite Coal, and for rendering the whole of the heat evolved from fuel of any sort, available to the production of useful effect, in the treatment of bodies at rest. Granted to ELIPHALET NOTT, *Schenectady, New York, June* 29, 1833.

It having been discovered that the heat of an anthracite coal fire may be increased by more fully igniting its contained hydrogen; and it having also been discovered that the heat of a fire of any sort may be advantageously applied successively to the treatment of successive bodies; certain improvements have therefore been made for carrying the same into effect; which consist, in providing for the more com-

plete combustion of the hydrogen produced in the use of anthracite coal; and in concentrating several processes to which the heat produced in the use of fuel of any sort can be conveniently applied;—always beginning with a process that requires a high temperature, as the reduction of ore, and the manufacture of metals, or the subsequent melting or heating thereof, for the purpose of being cast or wrought into other forms; and proceeding thereafter to processes requiring a lower temperature, as iron to be annealed, or pit coal, or rosin, to be decomposed for the production of gas: by interposing between a cupola, forge, furnace, or chamber of combustion and a boiler, or a chimney if no boiler be in use, an elongated chamber of treatment, of nonconducting material, either vertical, inclined, or horizontal; or in part the one, and in part the other; the same being exhibited either in a single channel, having, when required, recesses formed along the line thereof, that certain bodies, or bodies in certain localities, can be placed more or less out of the main current of the contained flame; and having also inspecting apertures, and apertures for the ingress and egress of bodies, or for the admission of air for the cooling of the interior, or the ignition of the contained hydrogen, all governed by valves:—or the same, or some part thereof, being exhibited in two or more channels, placed side by side, or one above the other, and so divided into compartments, and furnished with additional interior inlets and outlets governed by valves, that bodies under treatment can be passed from one end to the other, and that the flame can be passed in the one channel, or the other, and caused to bear with greater or less intensity on the bodies in any locality of either, or carried off from them all to the chimney through a separate flue governed by a valve: and in the keeping up the temperature along the line of said chamber of treatment after the process of melting in the cupola has ceased;—by converting a section of said chamber of treatment into an occasional chamber of combustion, and separating the same by a valve from the cupola, unless it be deemed preferable to make use of the cupola itself, in such case, as a mere chamber of combustion; and in causing the entire volume of flame, however divided in its passage, to bear upon the boiler, (if a boiler be employed,) which is always to be placed late, if not last, in the series of bodies to be treated, and the steam thereof, besides driving an engine employed in heating water to be used in other processes, as drying, bleaching, &c.: and in providing, adjoining the boiler, an auxiliary furnace, to be used when necessary; and in governing by valves the inlet to the boiler from the cupola, and the inlet to the furnace from the external air, so that when the flame from the cupola ceases, the inlet to the boiler may be closed; and when the flame from the cupola is sufficient for the boiler, the inlet to the furnace from the external air may be closed; unless when opened for igniting the hydrogen from the cupola, or for cooling the interior.

It is understood, that, when practicable, the air introduced for the ignition of gas, should be heated, by being passed between the crust of the fabric, and an exterior, or second crust, so enveloping the whole as to form an air chamber. And it also being understood that

a double arrangement is to be preferred, so that as one apparatus is repairing, the other may be in use.

For further information reference must be had to the drawings hereunto annexed.

[The specification next contains a "summary" of the improvements, in which the foregoing is recapitulated, but somewhat condensed; this part we omit, and proceed to the claim, which varies but little from the summary.]

I therefore claim as my invention and improvement, the invention of the increasing of the evolution of heat in the use of anthracite coal, and the rendering the entire heat evolved in the use of fuel of any sort available to the production of useful effects, by concentrating and arranging in the order aforesaid, the several processes to which the said heat can be conveniently applied in the treatment of successive bodies, or of bodies divided into successive portions at rest; by interposing between a cupola, forge, or furnace, a chamber of combustion and a boiler, or a chimney if no boiler be in use, an intermediate chamber of treatment, exhibited and furnished as aforesaid, or exhibited and furnished in any other manner, provided adequate provision be made thereby for the ignition of the hydrogen of anthracite, and for rendering the entire heat from fuel of any sort productive of useful effect, by applying the same successively to such several processes as can be conveniently carried forward by the treatment of successive bodies at rest.—Also the preventing the injurious effects of the flame of a cupola upon a boiler in contact therewith; and the diminishing of the reduction of the temperature to which it is exposed while charging the cupola, by the removal of the same to a distance therefrom. Also the protecting of the boiler, however situated, against the action of the flame of a cupola, when too intense, by passing off a portion of the heat thereof through a separate flue governed by a valve: and also the governing of the inlet to a boiler from a cupola, by a valve; and the furnishing of a boiler by means of an auxiliary furnace, with the requisite heat when the cupola is not in blast, or when the heat thereof is insufficient, together with the uses to which the same has been, or may hereafter be, applied.

ELIPHALET NOTT.

Specification of a patent for improvements made in the treatment of metallic bodies generally; as well those that admit of motion while under treatment, as those which require to be at rest. Granted to ELIPHALET NOTT, *Schenectady, New York, June* 29, 1833.

It having been discovered that metallic bodies oxidize less when exposed to the action of the products of combustion, than when exposed to the action of the elements of combustion; and it also having been discovered that contiguous bodies at different temperatures, and

moving in opposite directions, exchange temperatures, therefore certain improvements for carrying these discoveries into effect have been made: which improvements consist;—In preventing the oxidizing of metallic bodies by treating the same in all cases in a chamber separate from the chamber of combustion: and in economising the expenditure of heat generally by concentrating the processes to which the same can be conveniently applied;—and in arranging the whole in a series according to the degree of temperature required in each, always proceeding from the greater to the less, and in dividing the material to be treated into portions, and arranging the same in successive localities, and in passing the same (so far as they admit of being moved from one compartment to another) towards the chamber of treatment along the same channel through which the flame is caused to escape therefrom, and to act as it escapes on successive bodies under treatment, till the whole available temperature has been expended before the same enters the chimney; all of which is effected either by means of a vertical reverberatory, or zig zag chamber of treatment, consisting of a series of compartments separated by solid and fixed floors, more or less inclined and arranged one above another, and furnished with appropriate rests or ways, for sustaining incumbent bodies under treatment, and for passing the same down to the next locality when treated; and furnished also with apertures for inspection, and for the ingress and egress of bodies, and the introduction of the requisite instruments for adjusting and removing the same—or by means of a vertical, reverberatory chamber of treatment, consisting, in like manner, in a series of compartments arranged one above another, and separated by floors in part solid and fixed, and in part open and movable, either by levers, or eccentric axes, piercing the crust and worked from without, in such manner, that the contents of each superior compartment can at pleasure be passed down into the next inferior compartment;—or by means of a vertical chamber of treatment without reverberations, consisting in like manner of a series of compartments arranged one above another and separated by floors, more or less open, and wholly movable, either by eccentric or by central axes, piercing the crust, and worked as aforesaid, from without, in such manner that the contents of each superior compartment can be emptied by a revolution of its floor into the compartment under it:—which several chambers of treatment must be connected, each at its lower extremity, with the outlet for flame from the chamber of combustion;—or with the outlet for flame from a cupola, having an inlet for flame thereto from a separate chamber of combustion; or with a cupola, or other furnace, constructed in the usual manner: and each must also be connected at its upper extremity with an additional section of a horizontal chamber of treatment exhibited in one or more channels for the application of the surplus heat in the treatment of additional bodies requiring lower temperatures, as pit coal and rosin contained in retorts for the production of gas: and water in boilers for the generation of steam, to be employed for driving an engine, and thereafter for heating additional water for drying, bleaching, or any other process.

For further information reference must be had to the drawings and explanations deposited in the patent office.

[Summary.]

I therefore claim as my invention and improvement the diminishing of the oxidizing of metallic bodies, by treating them, whether in cupolas, forges, or other furnaces, in a chamber distinct from the chamber of combustion;—and the economising of the expenditure of heat in the treatment of bodies generally, by concentrating all the processes to which the same heat can conveniently be applied, and arranging the order thereof according to the intensity of the temperature required by each;—and the dividing of the bodies to be treated, exclusive of those contained in the cupola, forge, or other furnace, into portions, and arranging the same successively, in successive localities, and of moving the bodies that admit of motion which are under treatment, towards the chamber of combustion, along the same channel through which the flame is passing off from said chamber in an opposite direction; always putting the new material into the locality further from the chamber of combustion, and removing the material sufficiently treated, from the locality nearest the chamber of combustion, by means of a special chamber of treatment, constructed, connected, and managed, as already described; the same being interposed between a cupola, forge, or other furnace, and the boiler, or the chimney, if no boiler be in use; or by any other means, provided the chamber of treatment be separated from the chamber of combustion throughout; and provided the different processes to which the same heat can be applied be concentrated, and the succession ordered according to the degree of temperature required by each; and provided also, the material to be treated be divided into parcels arranged in successive localities; and, if capable of motion, be moved in one direction towards the chamber of combustion along the same channel through which the flame is passing from the chamber of combustion in an opposite direction; together with the uses to which the same has been, or may hereafter be, applied, in the reduction of ores, the manufacture of iron, or other metals, the melting, or heating, of the same, to be cast, or wrought, into different forms, together with the other processes of art, with which the same may be combined.

ELIPHALET NOTT.

Specification of a patent for a new manufacture of Wheels for Locomotive Engines and Cars, to run upon Rail-roads. Granted to MATTHIAS W. BALDWIN, *city of Philadelphia, June* 29, 1833.

To all whom it may concern, be it known, that I, Matthias W. Baldwin, of the city of Philadelphia, have invented a new and useful manufacture of wheels for locomotive engines and cars, to run upon rail-roads, and that the following is a full and exact description of my said invention.

Instead of making the wheels for the carriages of locomotive engines, and of other cars, or carriages, to be used upon rail-roads, of cast iron, or of a combination of cast and wrought iron, or of wood combined with cast or wrought iron, or with both, as they have been heretofore made, I cast the rims of such wheels, as well as in most instances the spokes and hubs, or naves, in one piece with the rims, of a composition of metal known to workmen under the name of hardened brass, or gun metal. It is not necessary for me to designate the proportions in which the respective metals are mixed which form the hardened brass or gun metal, as these will vary with the degree of hardness desired in the rim, or tread, of the wheel, in a manner well known to those conversant with the casting of brass and its compounds. Where it is desirable to increase the adhesion between the rail and the wheel, it may be found necessary to make the wheel proportionably softer, by decreasing the quantity of tin entering into the composition of them, or even to cast them of soft brass or of copper entirely.

I do not intend to confine myself to any particular form for the tread of the wheel, or for the spokes and hub; but to modify it in such way as experience may suggest to be the best adapted to the particular carriage or road to which the wheel is to be applied. I intend sometimes also, to cast the rim of the wheel of such metal without spokes, but furnished with such flanches, lodgements, or projections, as shall enable me to attach thereto, spokes of wood, iron, or other material.

My claim to an exclusive privilege I rest entirely upon a new manufacture of such wheels, by substituting for their rims, or for every part of them, a new material as hereinbefore set forth, the utility of which consists in its being better adapted to the purposes which they are intended to answer in running upon rail-roads.

MATTHIAS W. BALDWIN.

Specification of a patent for manufacturing Hose for Fire Engines, and for the Foundations of Machine Cards. Granted to SAMUEL D. BREED, *city of Philadelphia, June* 29, 1833.

To all whom it may concern, be it known, that I, Samuel D. Breed, of the city of Philadelphia, have invented a new and useful mode or method of manufacturing, from cloth, the hose used for fire engines, and for the conveyance of water or other fluids for various purposes; and also of so preparing the same material by a similar process, as to serve as a foundation for machine and other cards to be set with wire teeth; both of which articles have usually been made of leather. And I do hereby declare that the following is a full and exact description of my said invention.

The cloth employed for either of the above purposes is to consist of two or more thicknesses, saturated with, and cemented together by, a solution of caoutchouc, sometimes called gum elastic, or India

rubber. I dissolve the caoutchouc in rectified spirits of turpentine, naphtha, oil of sassafras, or any of the other menstrua in which that substance is soluble; to which solution I sometimes add resinous substances, or drying oils, should I deem such addition to be necessary; always depending however upon the properties possessed by caoutchouc, and allowing it to form the main body of the solution or varnish. When hose is to be made, I cut the cloth into strips, and wind it spirally round a cylinder of metal, wood, or any other suitable material of the proper size; saturating it either before or after it is wound with the prepared solution, or varnish. I cut the cloth of such a width as to allow it to lap over in winding, one or two inches, or any other desired distance, taking care in every successive winding so to lap as to break joints with the former. Any number of thicknesses of cloth necessary to give the strength required, may be thus used. For this, no rule can be given, as it will depend not only on the use to which the hose is to be put, but also upon the strength of the material itself. After this first saturation the varnish is allowed to dry, when another coating thereof may be given, and the hose be afterwards removed from the cylinder.

When I prepare the cloth to serve as a substitute for leather, in forming the foundation of cards, I in like manner saturate it with the before named varnish, cementing as many thicknesses together as the foundation may require. The cloth is then subjected to heavy pressure, until it is dry, or nearly so. When perfectly dried, the teeth are set in the usual way.

I do not claim to be the inventor of the above named varnish, or of the application of it to render cloth water proof; but what I do claim as my invention, is the manufacturing of hose, and of a foundation for cards, of cloth cemented together in two or more thicknesses, in the manner hereinbefore set forth, and thus employing it as a substitute for leather in the formation of these articles.

SAMUEL D. BREED.

Method of cleansing wool from its grease, and economising the residue.

M. Durcet, who has long been consulted by manufacturers, advised the following method, which was tried with complete success. Immerse the wool, well washed from dirt, in a vessel containing spirits of turpentine, and let it remain from thirty-six to forty-eight hours. Withdraw and immerse a fresh quantity. By means of a press, force out all the adhering spirit, spread the wool out to dry, and, when it is to be used, wash it in warm water containing a little alkali. When the spirits of turpentine will no longer act upon, or remove, the grease, distil it for fresh use, and the matter remaining in the still, treated with soda, will make good soap.

[*New Ed. Philos. Jour.*

¶ *Clay for Sculptors.*

Sculptors who prepare their models in clay, have frequently occasion to leave their work for a long time unfinished; and, in such cases, often experience much difficulty from the drying and shrinking of the material. It is well to know, that, by the addition of from ten to fifteen per cent. of muriate of lime, well worked or kneaded into this clay, it will be preserved for almost any length of time in a moist state, and fit for a renewal of a work without any preparation.

[*Ibid.*

Meteorological Observations for October, 1833.

Moon.	Days.	Therm.		Barometer.		Wind.		Water fallen in rain.	State of the weather, and Remarks.
		Sun rise.	2 P.M.	Sun rise.	2 P.M.	Direction.	Force.		
				Inches	Inches			Inches.	
	1	58°	62°	30.05	29.90	NE.	Brisk.	0.43	Cloudy—drizzle—rain.
	2	68	68	29.70	.70	SW. W.	do.	0.02	Rain—flying clouds.
	3	48	65	.80	.80	W.	do.		Clear day.
☽	4	46	60	30.04	30.10	W.	do.		Clear—flying clouds.
	5	38	64	.30	.00	W.	Moderate.		Clear—white frost—fly. cl'ds.
	6	48	65	.20	.20	W.	do.		Clear—flying clouds.
	7	50	66	.10	.00	W.	do.		Cloudy—rain in night.
	8	62	60	29.70	29.60	W.	Blustering	2.08	Rain—flying clouds.
	9	54	67	.70	.80	W.	Moderate.		Clear day.
	10	50	66	.80	.70	W.	do.		Clear day.
⊗	11	38	54	30.00	30.05	W.	do.		Clear day.
	12	44	56	29.90	29.64	W.	do.	3.00	Cl'dy.: rain in n't.: high wind.
	13	38	56	.60	.64	W.	Blustering		Cloudy—flying clouds.
	14	44	56	.83	.90	W.	do.		Clear day.
	15	45	65	.95	.90	W S.	Brisk.		Cloudy day.
	16	60	70	.75	.75	S	do.	0.33	Cloudy—rain in the night.
	17	64	70	.70	.60	S. SW.	do.		Cloudy—flying clouds.
	18	47	54	.70	.85	W.	do.		Clear—flying clouds.
	19	36	51	30.15	30.20	W.	Moderate.		Clear—frosty—lightly cloudy
☾	20	39	43	.15	.10	NE.	do.	1.50	Rain.
	21	40	43	29.90	29 90	NE.	do.	1.60	Rain.
	22	44	44	.70	.70	W.	do.	0.11	Rain—cloudy.
	23	31	51	.80	.86	W.	Brisk.		Clear—frost—clear.
	24	38	59	.75	.60	W.	do.		Lightly cloudy—clear.
	25	29	61	.50	.50	W.	do.		Cloudy—hazy.
	26	42	53	.75	.60	W.	Blustering		Cloudy—flying clouds.
	27	39	56	.55	.60	W.	do.		Lightly cloudy—clouds.
☺	28	42	49	.60	.60	W.	do.		Cloudy—flying clouds.
	29	30	43	.70	.75	W.	do.		Clear: white frost: flying cl'ds
	30	28	38	.90	30.00	W.	do.	0.01	Light fall of snow—clear.
	31	26	42	30.25	.25	W.	do.		Clear day.
	Mean	44.06	56.68	29.85	29.83			9.23	

	Thermometer.	Barometer.
Maximum height during the month,	70. on 16th & 17th.	30.30 on 5th.
Minimum do. . . .	26. on 31st.	29.50 on 25th.
Mean do. . . .	50.38 .	29.84

Note—Owing to the sickness of the observer, which was not communicated in time to supply his place, the record of the dew point is unavoidably omitted this month.—Com. Pub.

INDEX.

AMERICAN PATENTS, LIST OF, WITH EDITOR'S REMARKS, &c..